July 21, 1958

Paper Trade Journal

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First Southern In-the-Forest Debarking & Chipping Operation

Finishing Room— Step Child of the Mill

Literature Review of Color and Sulphide Problems in Water

Practical Application of Statistics to Pulp Washing

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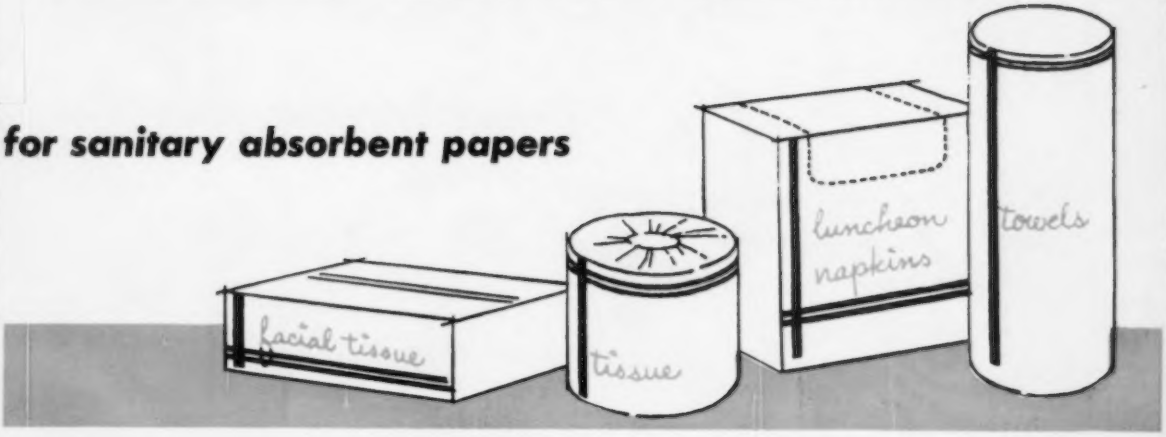
for sanitary absorbent papers



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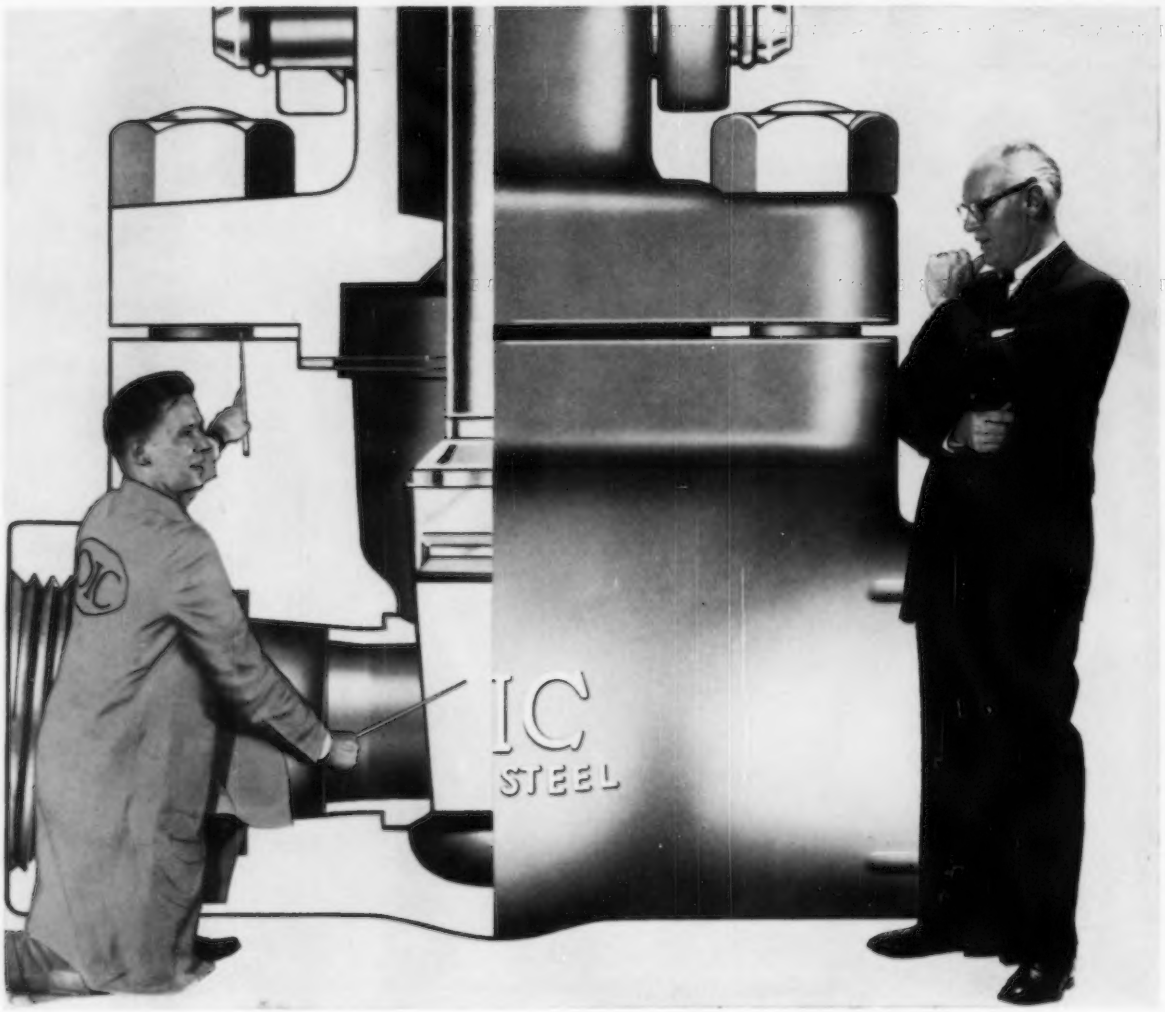

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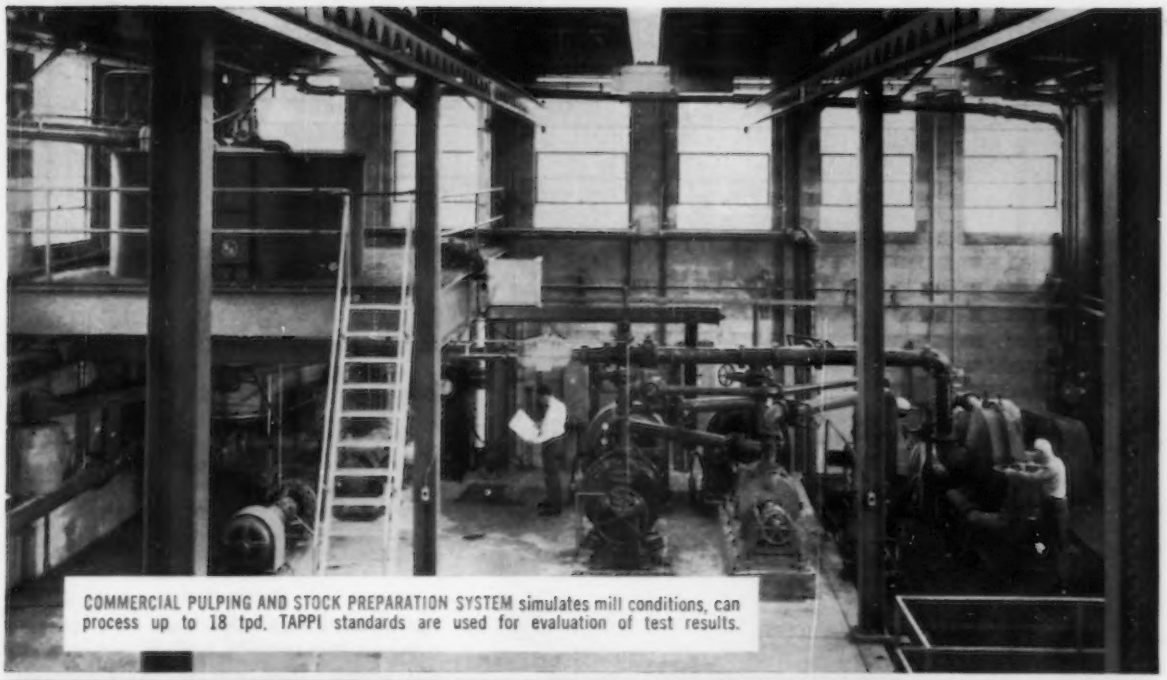

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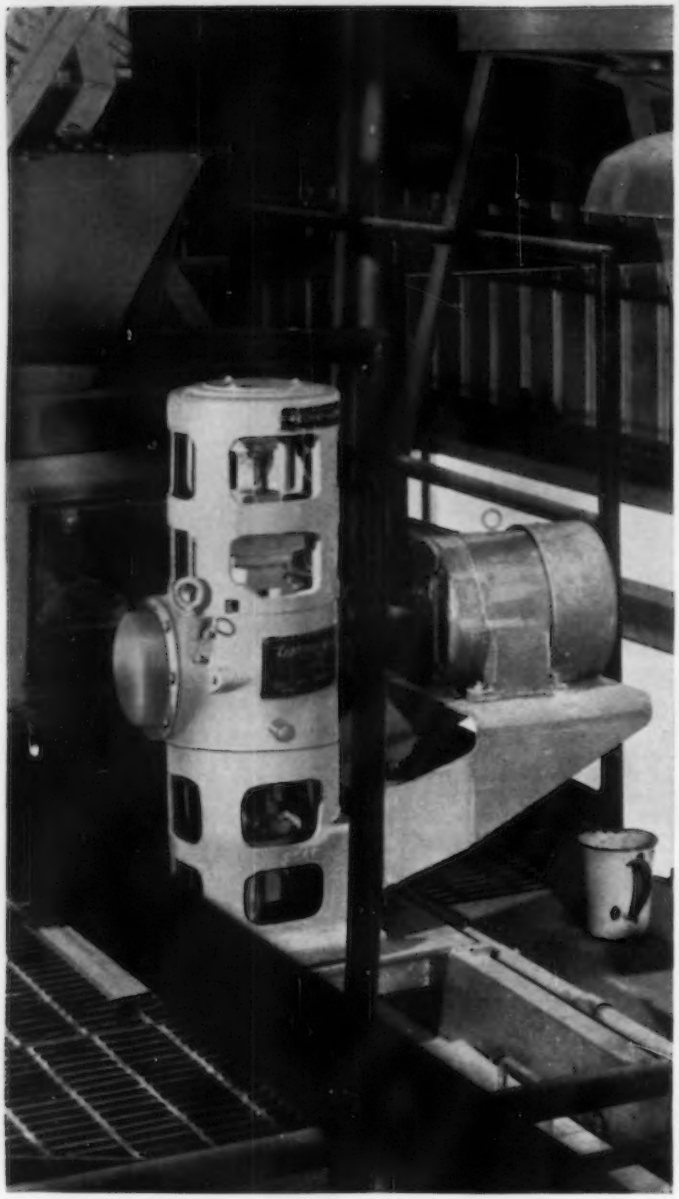

How starch is mixed

in new St. Regis system

Here's the starting point of a continuous 5000-gal./hr. system that feeds starch to the "Seminole Chief," new No. 2 paperboard machine at St. Regis Paper Company, Jacksonville, Fla.

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Paper Trade Journal

PUBLISHED WEEKLY SINCE 1872

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REMEMBER THESE DATES

July 28-Aug. 1: TAPPI Engineering Conference Multnomah Hotel, Portland, Ore.

Sept. 10-12: Third International Mechanical Pulping Conference sponsored jointly by Technical Section, Canadian Pulp and Paper Assn. and Technical Assn. of Pulp and Paper Industry; Chateau Frontenac, Quebec City.

Sept. 24-26: 12th Alkaline Pulping Conference, Arlington Hotel, Hot Springs, Ark.

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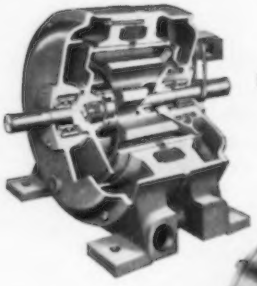

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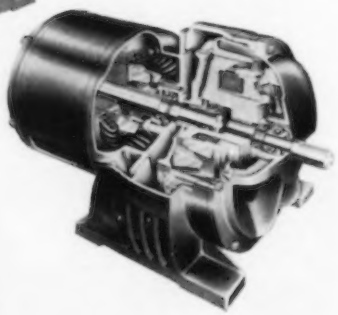

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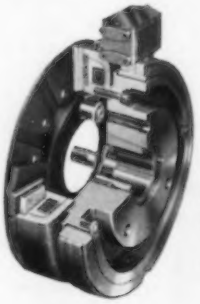

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TRENDS

JULY 21, 1958

Hudson Attacks Recession Thinking

Hudson Pulp & Paper Corp. is staging an all-out drive called "Operation Capacity," to inspire enthusiasm and improve morale in its employees in five plants. The end purpose is to increase sales, improve quality, lower costs and promote plant efficiency. The program includes: illustrated talks to employees: expanded suggestion plan programs; prizes for departmental efficiency; advertisements in newspapers in the plant areas, etc., etc. Such an aggressive program is bound to produce concrete benefits and other companies may well consider a similiar attack on our problems. "Operation Capacity" is described in detail in this issue.

Finishing Rooms Need More Attention

What is said to be the most neglected and least efficient part of our industry's operations, our finishing rooms, is discussed in a feature article in this issue. Many finishing operations are wasteful of both labor and paper. We plan a comprehensive series of articles by experts on this subject, together with articles describing some of the newest finishing rooms in the country.

Paper Clothing Use Grows

Wide use of paper clothing has long been a favorite prediction of expansive after-dinner speakers. Recent progress in this direction indicates that there was at least some truth in these forecasts.

Weeks Sees Economy Stronger

Secretary of Commerce Sinclair Weeks made the following statement about the economy at a news conference last week: "Generally speaking, the feeling is better. Businessmen with whom I talk are confident that business is going to be better and on the part of consumers there is increasing evidence that their confidence is in the process of being restored. This latter statement seems to me to be borne out by the fact that personal income is hanging right around the all-time August 1957 high. From this all-time high it has dropped about ½ of 1% against a drop in industrial production of 13%. This is considered by economists a most unusual phenomenon and reflects the overall stability of our economic system."

Putting Shoe on Other Foot

Farmers in this recession period are enjoying their highest level of prosperity in some time. For years now our industry, as taxpayers, have been subsidizing the farmers. It would seem only fair if some means could be worked out for them to pay us back now that we are experiencing a financial set-back.

There will be no Trends page for the next two weeks as our Trends editor is out visiting mills and talking with key company personnel.

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Aerial view of Thiele plant and mines at Sandersville, Ga.

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Bathurst Adds Cylinder Machine

Bathurst Power & Paper Co. Ltd. announces an increase in its capacity for the production of high quality boxboards through the addition of a second specialty cylinder machine.

Bathurst has produced boxboards for the packaging industry in Eastern Canada and for export for many years. The addition of a second boxboard machine will provide an additional 25,000 tons annually for these markets. Installation will start immediately and production is scheduled to commence early in 1959.

FTC Examiner Backs Scott in Trust Case

A Federal Trade Commission hearing examiner has issued an order which would dismiss charges that the acquisition by Scott Paper Co., Chester, Pa., of three concerns in the paper industry violates the anti-trust laws. This is not a final decision of the Commission and may be appealed, stayed, or docketed for review.

The examiner, William L. Pack, granted Scott's motion to dismiss made after conclusion of the evidence in support of the FTC's complaint of June 1, 1956. The record, he held, does not show a reasonable probability that the acquisitions may result in a substantial lessening of competition or tendency toward monopoly in any line of the highly competitive sanitary paper products industry.

In challenging the following three acquisitions, the complaint had alleged they increased Scott's timber resources, pulp mills, and converter facilities: (1) Soundview Pulp Co., Everett, Wash., a bleached sulphite pulp producer which was merged into Scott on November 9, 1951, by the issuance of $60 million in stock; (2) Detroit Sulphite Pulp and Paper Co., Detroit, Mich., which manufactured base paper stock but no consumer products, and which Scott obtained on September 2, 1954, for stock valued at $11 million; and (3) Hollingsworth & Whitney Co., Boston, Mass., a manufacturer of numerous paper products, none competitive with Scott's, which was acquired by Scott on October 27, 1954, in exchange for $38 million in stock.

The examiner placed particular significance on these facts: none of the three concerns competed with Scott in these products; and there is no suggestion in the evidence that the mergers have had an adverse effect on the ability of Scott's competitors to obtain pulp, paper stock, or other needed materials.

Newsprint Group Suggests Tariff Study

A current proposal to incorporate the U.S. Treasury Department definition of standard newsprint into the Tariff Act might deprive U.S. publishers and their Canadian suppliers of the benefits of future technological advances and delay newsprint deliveries, according to an editorial in the July issue of Newsprint Facts.

The bimonthly publication of the Newsprint Information Committee, composed of a representative group of Canadian producers, suggests that the proposal, being considered as part of a general customs simplification program, warrants close attention by publishers.

The text of the editorial follows:

"A current proposal before the U.S. Tariff Commission warrants the closest possible attention by U.S. newspaper publishers. As part of a general customs simplification program, it has been proposed that the U.S. Treasury Department's definition of standard newsprint be incorporated into the Tariff Act.

"This 'definition' is not a definition. It is a series of general guides to custom inspectors evolved from Custom Court decisions over the years. It is intended to help identify, even under changing technological conditions, the class and quality of paper regularly used in the publication of newspapers and intended by Congress to be admitted duty free for that purpose. It has served this purpose well.

"If the present specifications were made part of the Tariff Act they would cease to be guideposts and, perforce, would become ends in themselves, incapable of interpretation in the light of changing conditions. They could not be changed without an Act of Congress and they would have to be administered literally and inflexibly and uneconomic for everyone concerned."

House Okays Duty-Free Narrower Newsprint

The House Ways and Means Committee has overwhelmingly approved a bill to permit newsprint rolls as narrow as 13 inches to be imported duty-free. The law now exempts from duties paper rolls which are at least 15 inches wide. The legislation, sponsored by Rep. Frank Ikard (D., Tex.) was sought by newspaper publishers who said it was necessary to meet the trend toward narrower newspaper pages.

Union Bag-Camp Acquires Miller and Miller

Union Bag-Camp Paper Corp. has announced the acquisition of all the capital stock of Miller and Miller, Inc., of Atlanta, Ga. through an exchange of stock. The company will continue to be operated by the present management as a wholly owned subsidiary of the parent organization.

Miller and Miller manufactures high-grade printed labels and containers for the food industry.

CZ and Hawaii Test Bagasse Possibilities

Crown Zellerbach Corp. and the Hawaiian Suger Planters' Assn., will launch an expanded research and testing program this fall to determine the commercial feasibility of utilizing bagasse as a raw material for paper manufacturing in the Hawaiian Islands.

The joint program will begin with the construction of new facilities at the Crown Zellerbach central research department in Camas, Wash., and in Hawaii. The cost of the program, which will amount to $600,000, will be shared equally.

The combined research and testing project will include the following:

1—Specialized pulping and refining equipment at the Crown Zellerbach research laboratory to prepare bagasse for possible manufacture into papers of commercial quality on the company's standard paper machines in the Northwest.

2—A large scale pilot plant attached to the Oahu Sugar Co. on Oahu to study depithing of bagasse, by which the residual fiber and pith from sugar cane are separated.

3—Construction of large outdoor storage piles of bagasse at Hilo and Waipahu to determine the reaction of the raw material to dry and wet weather conditions.

Crown Zellerbach and the Hawaiian Sugar Planters' Assn. have been conducting joint laboratory research since 1952, and in 1954 concluded that it was technically feasible to make paper from bagasse. Since that time they have been exploring the economic feasibility of turning bagasse into paper and have been working out the details of the advanced testing and research program to be initiated this fall.

Most of the research work has been done at CZ's central research department at Camas headed by Dr. Wendell W. Moyer. The HSPA's role in the project has been coordinated by George W. Aljian, coordinator of the HSPA By-Products Project on loan from California & Hawaiian Sugar Refining Corp.; Harold C. Eichelberger, vice president and treasurer of American Factors, and Frederick Simpich Jr., secretary and vice president of Castle & Cooke.

The pilot plant on Oahu and the storage tests to be conducted in the Islands will be supervised by S. B. Knapp, pulp and paper technologist of the HSPA. Mr. Knapp is currently working with the Crown Zellerbach central research department in Camas and is scheduled to move to Honolulu in September. It is expected that the Hawaiian phase of the research program will take approximately nine months.

Around 1,000 tons of depithed bagasse will be shipped to Camas from Hawaii for further refining and manufacture into paper. It takes a ton of bagasse to produce approximately one half ton of paper.

The projected tests are designed to show whether it would be economically feasible to construct a paper mill in Hawaii which would use about 75,000 tons of bagasse a year. Hawaii produces about one million tons of bagasse annually, of which about five per cent is used to make wallboard. The rest is burned as fuel in the sugar mills at the plantations.

Editor John C. W. Evans

who is spending next month visiting mills in the Pacific Northwest and Western Canada.

Paper and Board Production

According to the American Paper and Pulp Assn., the ratio of the United States production to mill capacity for the week ending July 5, 1958, was 48.0 per cent compared with 86.8 per cent revised for the preceding week. The ratio was 51.6 per cent for the corresponding week a year ago.

The paperboard production ratio for the week ending July 5, 1958, was 61 per cent compared with 89 per cent for the preceding week and 54 per cent for the corresponding week last year.

(Detailed statistics on page 20.)

Six Weeks' Strike Ends at M&O

A strike which had been in progress for six weeks at Minnesota and Ontario's International Falls plant has ended with the return to work of employees of the specialty mill and Insulite board plant.

The strike ended when 260 maintenance workmen, members of three unions representing electricians, machinists and pipe fitters, withdrew demands for a guaranteed 40 hour work week and premium pay for Saturday as such. They accepted the company's offer of a 5 cents per hour across the board increase and adjustments of 5 to 7 cents per hour. This was the same proposal previously accepted by 85 per cent of M&O's 1600 employees.

Long-Bell Building Kansas City Warehouse

Long-Bell Division of the International Paper Co. will start construction this month of a 100,000 sq. ft. office and warehouse building on a seven-acre tract in the Fairfax district of Kansas City, Kans.

It will be used for central pooling for six other warehouses operated by International Paper—two at Enid, Okla., and at Oklahoma City, McAlester, Okla,. Fort Smith, Ark., and Amarillo, Tex.

Canadian Fine Paper Report for May

Canadian fine paper production and shipments were off slightly in May and the first five months.

Output for the month totalled 23,829 tons as against 24,449 tons for the same month last year. Production to the end of May was 109,292 tons this year as compared with the year ago figure of 111,165 tons.

Fine paper shipments in May totalled 22,974 tons, including domestic shipments of 21,910 tons and exports of 1,064 tons. In May last year, shipments were 23,907 tons of which 22,590 tons went to Canadian consumers and 1,317 tons to export markets.

Total shipments in the first five months were 108,515 tons this year as against 110,610 tons last year. Domestic shipments for the period were 102,345 tons as compared with 104,186 tons last year while exports were 6,170 tons as against 6,424 tons in 1957.

Coated paper output in May was 2,641 tons as compared with 2,696 tons a year ago. Shipments for the month were 2,718 tons this year and 2,746 tons in 1957. In the first five months, coated paper production totalled 12,416 tons and shipments 12,445 tons. For the same period last year production was 12,789 tons and shipments were 12,694 tons.

Buckeye Cellulose Wins APPA Safety Award

Heading the list of the 1957 Safety Award winners announced by the Americans Paper and Pulp Assn. was the Memphis, Tenn., Cellulose and Specialties Division of Buckeye Cellulose Corp. Based on the low 5-year cumulative disabling injury frequency rate of 0.62, Buckeye's Memphis Division won not only the national award but had the lowest rate of the mills reporting from the Central Region. States in the Central Region are Delaware, Maryland, Virginia, West Virginia, North Carolina and Tennessee.

Other regional winners are The Flintkote Co., Mt. Carmel, Ill., with the lowest frequency rate of 1.12, in the Midwest States of Ohio, Indiana, Illinois, Iowa, Missouri and Kansas.

Falls Power and Paper Co., Division of Scott Paper Co., Oconto Falls, Wis., with a low frequency rate of 1.56 won in the Lake States of Michigan, Wisconsin and Minnesota.

Winner in the Mid-Atlantic States of New York, Pennsylvania and New Jersey was the P. H. Glatfelter Co. of Spring Grove, Pa., with the low rate of 1.83.

In the South, which in this instance covers the states of South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Texas and Arkansas, a rate of 2.43 won for the Crossett Paper Co., Crossett, Ark.

The New England States from Maine to Connecticut had a winner with a rate of 2.64 earned by Fraser Paper Ltd., Madawaska, Me.

In the Pacific Coast States of Washington, Oregon and California, the Crown Zellerbach Corp. mill at Port Townsend, Wash., was low with a rate of 3.42. The injury frequency rate is the number of disabling injuries for every million man hours worker.

Of the 340 mills reporting to the American Paper and Pulp Assn., 24 had no disabling injuries for 1957 only and therefore had frequency rates of 0.00 for that year. These 24 mills will receive appropriate certificates while the regional and national winners will get plaques. The regional plaques given for a 5-year cumulative record will remain in the possession of the winners while the grand national award, also for a 5-year record, will remain in the winner's possession for the current year and may be passed along to a new winner each year.

The over-all frequency rate for the pulp and paper industry continues to fall, being 8.2 for 1957, a 10 per cent decrease from the 9.1 rate of 1956.

Scholarships for Pacific Coast Students

Three undergraduate scholarships, effective for the school year of 1958-1959, have been announced by the Pacific Coast Division of the American Pulp and Paper Mill Superintendents Assn.

One of the three scholarships will go to a student at Oregon State College, Corvallis, Ore.; another, to a student at the University of Washington, Seattle, Wash.; and the third to a student at the University of British Columbia, Vancouver, B. C.

The scholarship in no case shall exceed $225 a year. Should the annual tuition and fees of the student to receive it be less than $225, the scholarship will be for the lower figure.

New Consultant Will Help Us Serve Our Readers

Paper Trade Journal editors are proud to announce that we have retained the services of Walter L. Benz as consultant in typography and presentation. With his help, we will make our magazine even more readable and attractive looking.

Mr. Benz' specialized study in graphic arts started in the area of typographic design. Following a year of study in fine arts, he received two years of study and training under the personal guidance of the late Theodore Berger, distinguished German typographic designer and printing craftsman. Further study of graphic arts and management subjects was pursued at Carnegie Institute of Technology and New York University.

He has held managerial positions since 1936 when, at the age of twenty-two, he became a night foreman with a large printing firm in the East, later being placed in charge of the firm's technical book, catalog and special publication production, head of the photoengraving and cut departments, as well as editor of the company's house magazine.

In 1943 he entered the publishing field. He has been production manager, business manager, and general manager in the employ of the Advertising Management Division of the American Chemical Society Publications; Chilton Co.; and "Research & Engineering".

James E. Jones

Joins APPA Staff

The American Paper and Pulp Assn. has appointed James E. Jones as secretary of the Association's industrial relations committee.

Filling the vacancy left by the resignation of Harrison J. Daysh, Mr. Jones comes to the Association from the Bigelow-Sanford Carpet Co., Inc., where he rose from the position of quality control inspector in 1950 to executive office personnel manager. He was responsible there for the personnel and industrial relations program covering 1,000 employees in the executive offices and 20 sales districts.

Bag and Cover Assn. Elects Officers

Alvin A. Abramson, treasurer of the Central States Paper & Bag Co., Inc., St. Louis, Mo., was elected president of the Industrial Bag and Cover Assn. at the Association's eighth annual meeting which was held at Montauk Manor, Montauk, Long Island, New York, last month.

A. L. Park, Bemis Bro. Bag. Co., St. Louis, Mo., was elected vice president of the Association and Philip O. Deitsch was re-elected the Association's administrative officer.

In addition to Mr. Abramson and Mr. Park, the following were elected to the Association's board of directors: Harry M. Hanson, Kennedy Car Liner & Bag Co., Inc.; M. P. Williams, Cadillac Products Inc.; and John Metzenberg, Cromwell Paper Co.

Army Testing Paper Clothes

A new type of "fatigue clothing" made of strong, soft texture, light green corrugated paper, is being tested by the Army at Fort Deven, Mass. The garment consists of a coat and pajama-type trousers and is designed to be worn over other clothing as a protection against dirt and wear.

NEWS OF CONVERTERS

Folding Carton Plant . . .

to be built in Dallas/Fort Worth industrial district is pictured in this architect's drawing. The $2,500,000 plant will be built by Great Southwest Corp. for Container Corp. of America.

New Equipment for O-I Bag Division

Installation of new equipment to increase the capacity of Owens-Illinois Glass Co.'s Multiwall Bag Division plant at Valdosta, Ga., has been announced by Tom W. Brown Jr., division manager.

New machinery currently being added to the plant's facilities includes two new tubers with the necessary supporting bottomers and printing presses.

When the modernization program is completed, Mr. Brown said, the Valdosta plant will rank with best equipped multiwall bag plants in the packaging industry. He said the new equipment will result in "a substantial increase" in the plant's production capacity.

Standard Appoints Asst. to General Sales Manager

Standard Packaging Corp. has announced the appointment of Joseph A. d'Avi to the position of assistant to the general sales manager.

Formerly, Mr. d'Avi was national sales manager of Buitoni Foods Corp., where he was in charge of marketing. Previous to that he was vice president of the Dromedary Division of National Biscuit Co.

All Doeskin Converting Now in Utica

Doeskin Products, Inc. has consolidated all converting facilities at their Utica, N. Y. plant. Speed-up of paper machines at their close-by Clayville, N. Y., plant has been completed.

The Rockland, Del. paper mill will continue to make paper but all converting will be done at Utica with their increased facilities.

White Succeeds LeBoutillier at Mead Containers

Philip LeBoutillier, Jr. has retired as vice president of Mead Containers, Inc., and general manager of the firm's Ottawa River division in Toledo, and William H. White has been elected to succeed him.

Mr. LeBoutillier will devote his time to other business interests and he will remain in a consulting capacity to the central staff of the Mead concern.

He was elected president of Ottawa River Paper Co. in 1947, a post he held until early this year when the firm merged with Mead Containers.

Mr. White was vice president-operations of Ottawa River Paper from 1950 until the merger with Mead.

Union Bag-Camp Opens Development Lab

Union Bag-Camp Paper Corp. has officially opened its new product development laboratory in Hoboken, N. J. The laboratory provides for the enlargement of research and development activities previously conducted at the company's plant in Hudson Falls, N. Y. Although some of the facilities are jointly operated, the laboratory houses separate product development sections for the company's different product divisions. Among these are specialty bags, corrugated boxes, multiwall bags, bleached and processed papers and board. Each product development section is completely equipped to provide laboratory evaluation of existing packages. To solve commercial packaging problems better, each section is able to duplicate the actual specifics of a customer's present method of packaging, handling and shipping his product. The laboratory also provides a center for customer consultation, development work on new products and new uses for established products.

The technically trained staff of 20 is headed by Lawrence Ross, director of the product development laboratory. Mr. Ross has been with the company for 35 years. He previously served as superintendent of the pulp and paper mill in Hudson Falls, N. Y. and for the last 12 years has been in charge of the product development laboratory there.

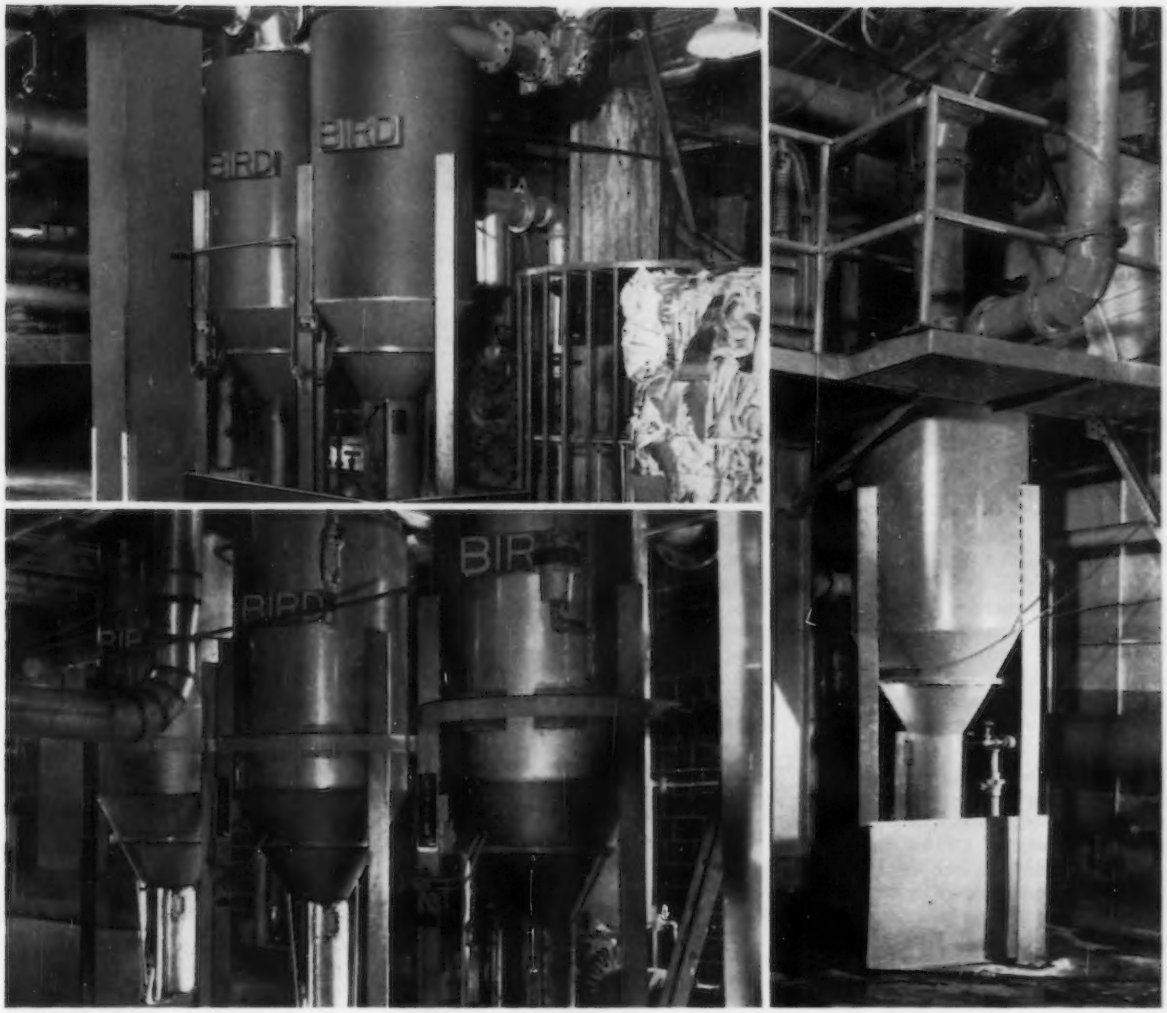
Jury Named to West Va. Bag Post

Roy E. Jury has been named Chicago district sales manager of the newly-formed Multiwall Bag division of West Virginia Pulp and Paper company.

The Multiwall Bag division is comprised of four plants recently acquired by the paper company from Fulton Bag and Products company and Arkell & Smiths.

Jury joined Arkell & Smiths in 1947 as a sales representative and was made a division manager in 1948. In 1950 he was appointed western sales manager and in November, 1955, became vice president in charge of western sales.

Stanley P. Herd has been named Dallas district sales manager of the Multiwall Bag division. He joined Fulton Bag and Products Co., recently acquired by West Virginia, in 1925 as a clerk and later became a sales representative. He was transferred to the company's Los Angeles branch in 1948 and a year later returned to Dallas as sales manager.



BIRD CENTRIFFLERS are saving thousands of maintenance and repair dollars

Because they remove junk and dirt before they can do damage, Bird Centrifflers are quickly paying for themselves out of the savings in pumps, wires, felts, knives, cutters and other equipment.

The Centriffler takes stock from the pulpers diluted to about 1½% and delivers up to 1500 gallons of cleaned stock per minute.

It has no moving parts and takes up only a fraction of the space required by the old, cumbersome riffler.

Feed can be by low head pump, by gravity flow or at 60 lbs. inlet pressure. Manual or automatic dirt removal.

Ask for layouts and estimates.

BIRD MACHINE COMPANY

SOUTH WALPOLE, MASS.

REGIONAL OFFICES: EVANSTON, ILLINOIS
PORTLAND, OREGON • ATLANTA 9, GEORGIA

Canadian Manufacturers of Bird Machinery
CANADIAN INGERSOLL-RAND COMPANY, Limited, Montreal

W. Va. Packaging Lab Set for Charleston

A new multiwall packaging laboratory designed to develop technical improvements in paper shipping sacks is being established at Charleston, S. C. by West Virginia Pulp and Paper Co.

The laboratory will be operated as a unit of the new Multiwall Bag Division recently organized by the company.

Manager of the new laboratory will be Richard P. Kessler, formerly director of packaging research for Arkell and Smiths, whose multiwall operations recently were acquired by West Virginia.

While equipped with constant temperature and humidity controls, the laboratory will be able to test multiwall bags under the most extreme conditions of heat and cold and even stage simulated rainstorms for testing purposes.

The laboratory will be equipped with completely automatic drop testing equipment, moisture-vapor barrier testing devices and an autographic stress-strain analyzer designed to measure the energy-absorption capacity, or toughness, of multiwall bag paper.

Company officials said the new laboratory is being located at Charleston because it is the site of the company's kraft mill which manufactures multiwall grades of Clupak stretchable paper, regarded as one of the most significant product developments in the paper industry during this century. The addition of the multiwall packaging laboratory is expected to provide strong technical support to product development and manufacturing activities being carried out at this location.

The company also disclosed that it was considering the future establishment of a multiwall bag producing facility at Charleston.

Mead Buys Stock of Miller Container

Mead Corp. has purchased the remaining stock of Miller Container Corp., Louisville, Ky.

Miller Container Corp. will be operated as a division of Mead Containers Inc., wholly owned subsidiary of the Mead Corp.

In July 1957, Mead Containers Inc. purchased a substantial interest in Miller Container.

Miller Container Corp. has operated a corrugated box plant in Louisville since 1954. Philip J. Miller, who was president of Miller Container, will continue as general manager of the Louisville plant.

Miller Container produces corrugated shipping containers and corrugated packaging specialties for the tobacco, food, furniture, and appliance industries in Kentucky, Southern Indiana, and Southeastern Illinois.

Within the near future, it is planned to add a corrugator to the present equipment at the Louisville plant to increase its capacity substantially.

Paperboard Honeycomb Absorbs Heavy Shock

An experimental, combat expendable platform which is lashed to a self-propelled anti-tank gun is reported to permit safe descent of 45 to 55 feet per second during airdrop tactics. Paperboard honeycomb shock absorbers cushion the equipment when it hits the ground.

New Paper Phonograph Records Available

A phonograph record made of paper, in which grooves are pressed in a vinylite coating has been contracted for by RCA Victor International Division for samplers to be bound into the June issue of a Latin American hi-fi trade magazine. Also, Electro-Voice, makers of stereo cartridges, are planning for a quantity of stereo paper disks to be bound into domestic music consumer magazines.

While paper disks are not a new product, the one now being offered is reputedly of higher reproduction quality than any seen before.

In quantities of 100,000, a seven-inch LP paper disk can be produced for less than 5 cents apiece, pressed on one side. For about a cent-and-a-half more, both sides can be pressed. This cost includes four-color process printing on one side of the paper, showing thru the vinylite, and two colors on the other. For simpler printing, the cost would be lower. The disks can be produced economically in quantities of about 25,000.

Clupak Names Engineering Director

Harold O. Balough, formally project engineer for the West Virginia Pulp and Paper Co., has been named director of engineering for Clupak, Inc.

Mr. Balough will be in charge of the various engineering aspects involved in licensing the new stretchable paper process recently introduced by Clupak, a company jointly organized by Cluett, Peabody & Co. Inc. and West Virginia Pulp and Paper Co.

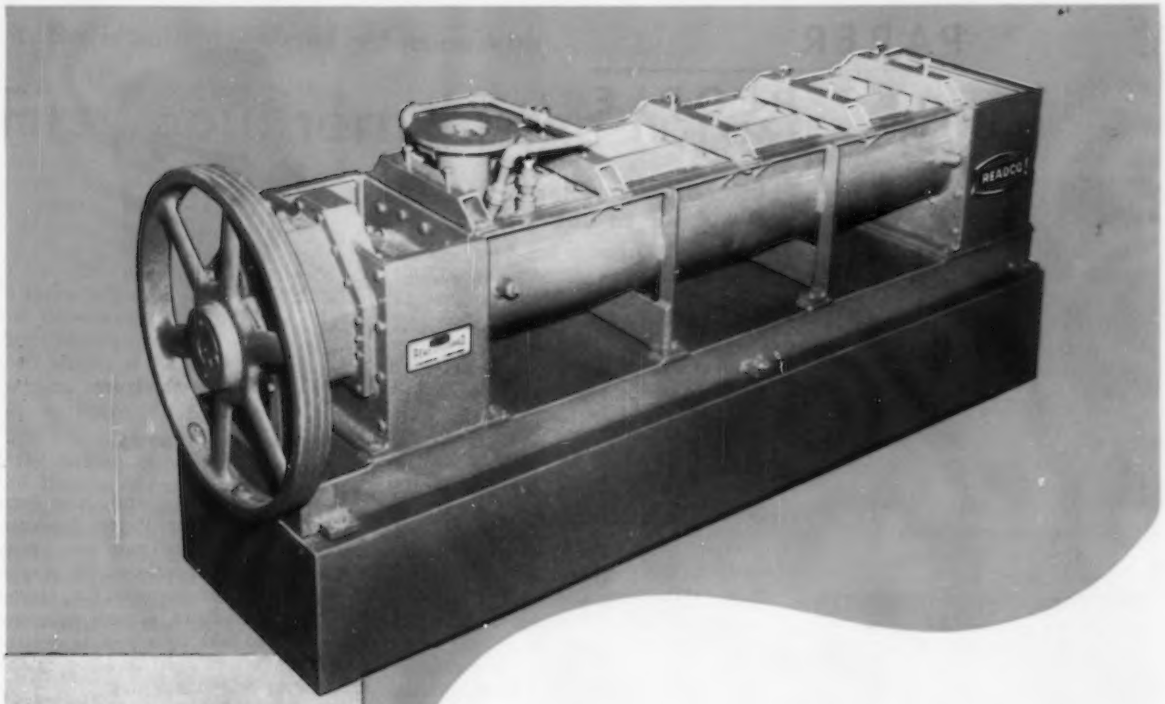
Mr. Balough has also been associated with the Hinde and Dauch Paper Co. prior to 1954 when it was made a division of West Virginia.

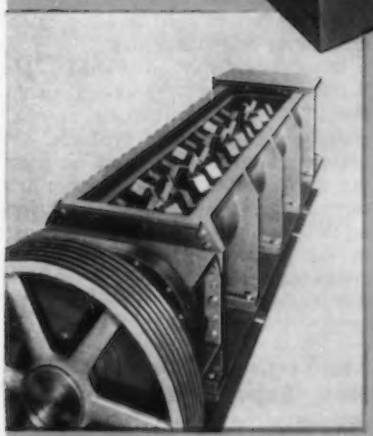
Sales Reps Named for Ajax Corrugated

Two sales representatives for Ajax merchant grade corrugated materials have been named in New York state, K. P. List, manager of merchant sales for Ajax Box Co., Chicago, division of St. Regis Container Co., announced.

George W. Beale Co., Westfield, N. Y., and Taylor Mill Representatives, Canandiagua, N. Y., will handle sales of regular single faced corrugated, flexible Bend-N-Rap single face and Ripple Cushion, with which both firms are well acquainted, Mr. List said.

Other representatives of Ajax merchant grades include Bardwell Sales Inc., Dallas; E. D. Warde Co., Denver, and the Harris Co., Macon, Ga.





READCO

3 CUBIC FEET A MINUTE

Perfectly Mixed!

Speed production, lower costs...automatically with Readco Continuous Double Arm Mixers

You can step up production and reduce costs of processing dense and viscous materials with this rugged Readco mixer. Built for continuous, automatic operation, it will turn out ½ to 3 cubic feet per minute . . . in a completely homogeneous mix.

Overlapping action of mixing paddles fully disperses ingredients while moving them along to discharge. Temperature controlling jackets for heating and cooling are standard equipment.

For further information on Readco mixing equipment, see Chemical Engineering Catalog pages 1483 to 1490.

Whatever the mixing job: a READCO mixer!

READ STANDARD
York, Pennsylvania

A Division of
Capitol Products Corporation

PAPER PEOPLE

Harold Skinner

Ralph Fannon

Skinner Succeeds Fannon in Marathon Pulp Sales

Harold Skinner has been appointed manager of pulp sales for Marathon, a Division of American Can Co., Menasha, Wis. He has for some years been superintendent of the Rothschild, Wis., pulp mill. Mr. Skinner succeeds Ralph Fannon who has retired after twelve years with Marathon.

Promoted at Rumford Mill

Malcolm C. White has been promoted from methods engineer to supervisor for materials handling with the Oxford Paper Co. mill, Rumford, Maine.

He joined Oxford in 1954 as methods engineer.

Joins Consolidated

Leo J. Welling Jr. has joined Consolidated Water Power & Paper Co. He will serve in the technical department. He graduated from Western Michigan College in June where he received a BS degree in Paper Technology.

International Elects Dalsemer to Board

Leonard Dalsemer has been elected to the board of directors of International Paper Co.

Mr. Dalsemer is president of Lord Baltimore Press, Inc., which became affiliated with International Paper last March through an exchange of stock. At that time he was elected a vice president of International Paper.

Marcalus Official Gets Degree at 44

Sam Pirozzi, just appointed as assistant to the president of the Marcalus Paper Manufacturing Co., East Paterson, N. J., got his college degree last month, at the age of 44.

His wife got her degree at the same time. Both received BS degrees in education from Paterson State College. Their three growing children looked on, and cheered, at the graduation exercise.

Mr. Pirozzi, who is presently traffic manager for the firm, has been with Marcalus since World War II.

Both had attended the Paterson institution when it was a "normal school," granting teaching certificates but not college degrees. Both got their certicates in 1935, after a three-year course.

Recently, Mrs. Pirozzi decided to return to teaching and to qualify for her degree in education.

"It was better than going out to a movie," her husband says, so he registered for two courses a week, with his wife. Mr. Pirozzi has no intention of going into teaching again, however. "I just went along for the ride," he says about his return to the classroom.

Mosinee Names Von Ende Manufacturing Manager

Mosinee Paper Mills Co. has announced that Carl A. von Ende has joined the firm as manager of manufacturing. He will be in charge of all manufacturing operations, from the wood yard to shipping.

Mr. von Ende took advanced work in chemical engineering at the Massachusetts Institute of Technology. Employment with S. D. Warren Co. followed and in 1947 Mr. von Ende went with Gilman Paper Co., where he became manager of manufacturing. For the past three years he has been manager of paper manufacturing for two mills of Brown Co., totalling seven paper machines.

Borje Wahlstrom

Wahlstrom Returns to Sweden

Borje Wahlstrom, who has been working with Anglo Paper Products, Quebec City, for the past two years, and for eighteen months at the Anglo-Newfoundland Development Co., Grand Falls, Newfoundland, is now returning to Sweden to take up a post as control and development superintendent in the kraft paper mill at Korsnas.

During his stay in Canada, Mr. Wahlstrom has been the second in command of the papermaking research group of Anglo Paper Products, and has concentrated on research on pressing in which he headed a team that carried out extensive experimental work on this. He also has played a major part in the headbox investigations of the group and the development of the taper flow headbox.

St. Regis Appoints New Export Manager

St. Regis Paper Co. has appointed Richard Sanderson Jr. export manager of the international department of the Kraft Division. In this post, he succeeds Theodore H. Hassold, who has retired.

Mr. Sanderson joined St. Regis in 1937 and served in various sales and sales promotion posts with the company until 1946 when he joined the International Division. He was appointed assistant export manager in 1957.

Joins Rhinelander

Alfred E. Wiegand has been named project engineer at the Rhinelander Paper Co. plant at Rhinelander, Wis. He is a 1958 graduate of the University of Wisconsin.

Keating Promoted

Frank J. Keating has been promoted to the position of assistant to the president of United Container Co.

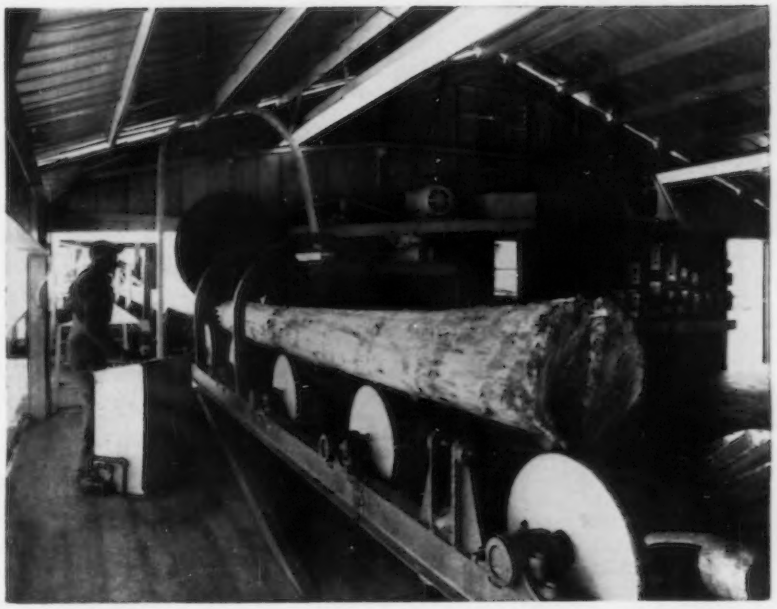
St. Regis anticipates cost reduction with . . .

First Southern In-the-Forest Debarking and Chipping Operation

The first installation in the South to make pulpwood chips by debarking and processing tree-length logs in the forest instead of debarking and chipping short lengths at the paper mill has been put into operation by St. Regis Paper Co. at Fargo, Ga., in its Suwannee Forest.

By making chips nearer the source and shipping them in hopper cars to the mill, the company hopes to increase the utilization of the tree and reduce the cost of wood fiber for kraft paper manufacture. The Fargo chips go to the St. Regis Jacksonville, Fla., mill which has a total demand of 1,800 cords of pulpwood a day.

The chip mill is designed to produce the equivalent of 320 cords of wood in a 16-hour working day. Original operation is on a five-day week basis with eight employees and a forman for each of the two shifts.



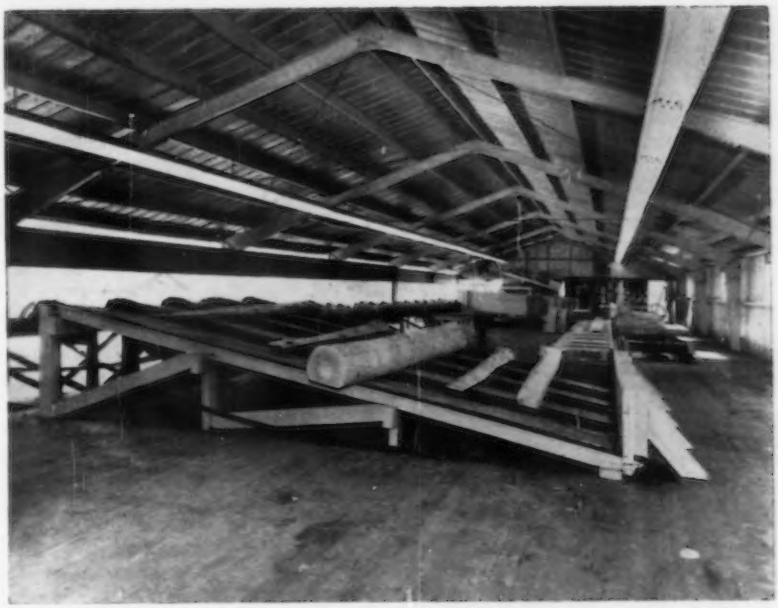
Cut-off saw takes off saw log portion of tree length log debarked in St. Regis Paper Co.'s new Fargo, Ga., chip mill. Pulpwood diameter portion of the log will be fed to chipper, chips—instead of logs—shipped from forest to paper mill.

Mechanical Handling Throughout

The tree-length logs from the 210,000-acre Suwannee Forest are handled mechanically from the time they arrive at Fargo until the chips leave in hopper cars, each holding about 15 cords, for the 75-mile trip along the Southern Railway to the Jacksonville mill.

First step is to weigh the trailer-loads of trees on a scale with 100,000 pounds capacity. After unloading, the empty trailer is weighed to give the net weight of the trees. Loaded trucks drive from the scale to the end of one of two Starr log unloaders. Each live deck of the Starr unloaders is 220 feet long and has a storage capacity of 160 cords of trees.

The skid arms of the unloader are thrust under the load of logs by the decks' cable system, and the entire load is raked onto the deck in a single motion. The traveling arms then move the trees to the flight conveyor 220 feet away that feeds a Nicholson Roto-Barker at a speed of 110 f.p.m. With the debarker working at 105 f.p.m., the conveyor can be kept full at all times.



Interior view of chip mill showing breakdown rig where logs too large for throat of 19-inch Hansel chipper are reduced to fit. Conveyor to chipper is at left of live deck holding ripped log and slabs. Pulpwood logs come straight through along conveyor at left.

Timber Products Selected

The debarked trees move on another flight conveyor to a cut-off saw. Here sawlogs, poles, pilings and other timber products can be selected, since the hour

glass roller conveyor beyond the cut-off saw is equipped with a double set of kickers. Still another set of kickers can send butts of trees too large for the chipper to a break-down rig.

This rig consists of a live log deck with hydraulic log stop and loader, a small Davis carriage with a belt-driven wire rope feed, and a circular saw driven by a 75 h.p. motor.

Broken down pieces are carried away by a roll bed discharging onto another transfer made live with roof top chains. They are then fed into the 230 f.p.m. chain conveyor which runs directly from the cutoff saw to the chipper carrying all the logs which already are small enough for the chipper throat.

Chips Conveyed to Rail Cars

Chips are made by an 8-knife, 84-inch Hansel chipper with a combination horizontal feed spout and gravity discharge running at 450 r.p.m. and powered by a 900 h.p. synchronous direct-connected drive motor.

The ¾-inch chips are fed by a double-stranded flight conveyor into a 36-inch inclined belt conveyor and then to a horizontal flight conveyor straddling three sets of railroad tracks. Traps over the first two tracks can be opened or closed, and a bottomless flight conveyor moved between the proper trap and the hopper car beneath. This "chip distributor" governs the flow into the car and levels the top of the load.

The three sidings each will accommodate 12 loaded or 12 empty cars, making it possible with an electric car spotter to load as many as 36 cars with only one switch by the railroad.

Accurate Records for Cost Evaluation

T. N. Baker of the company's Southern Woodlands Division is responsible for the operation of the Fargo chip mill and, with the company's central engineering staff, was responsible for its design and construction.

"The accurate records we are keeping at Fargo should soon show us," says M. G. Rawls, Southern woodlands manager at Jacksonville, "if our expectations of greater wood utilization and reduced costs will be realized. It is our belief that moving these steps in paper manufacture away from the mill and into the woods will cut costs and increase efficiency.

"We are fortunate that the timber standing on the Suwannee Forest is ideally suited for this type of operation in its size, proximity to the chip mill and in the way it can be logged, with trailers bringing as much as eight cords of wood to the mill in a single load."

Getting "Bugs" Out of the Paper

There are no more flies in the ointment at the Morart Gravure Corp. The company has electrocuted them.

Morart, a paper converting and processing company in South Hadley, Mass., was bothered for years by flying insects dropping into their processing liquids.

As R. P. Lavallee, a gummer operator there, put it, "Where we should have had smooth sticky surfaces on our paper rolls, we had bumps caused by bugs in our vats."

Now the paper surfaces are smooth and the company officials point with pride to their solution, a ring of 21 special hi-voltage insect traps stationed around both plant buildings.

Purchasing Agent Frank W. Sullivan says, "The traps consist of a special light and an electric grid. The light attracts the insects and the high-voltage grid kills them, when they come near. The traps work so well we have to wipe the grids clean every morning at 8."

How does the process work?

"Simple," says Mr. Sullivan, "the bugs get between the wires of the grid and 'poof,' complete the circuit."

Figures of the Week

PAPER PRODUCTION RATIO REPORT—American Paper & Pulp Assn. Figures

(Production as per cent of normal capacity)

COMPARATIVE WEEKLY SUMMARIES

1958	June 7 82.2	June 14 87.4	June 21 88.5	June 28 86.8r	July 5 48.0
1957	June 8 94.1	June 15 94.8	June 22 92.1	June 29 92.2	July 6 51.6

r Revised.

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1958	86.9	89.5	89.5‡	87.4‡	86.4‡	86.2‡	—	—	—	—	—	—	—
1957	94.2	97.0	97.1	94.0	94.6	93.3	75.6	90.7	86.0	93.0	90.7	81.5	90.9

‡Preliminary.

COMPARATIVE YEARLY SUMMARIES

	1951	1952	1953	1954	1955	1956	1957	1958
Year to Date	99.9	91.0	92.6	91.8	95.9	99.8	94.6	87.1
Year Average	98.0	88.6	92.3	91.6	94.0	97.9	90.9	

All of the above data is based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available.

PAPERBOARD OPERATING RATIOS†—National Paperboard Assn. Figures

COMPARATIVE WEEKLY SUMMARIES

1958	June 7 77	June 14 90	June 21 88	June 28 89	July 5 61
1957	June 8 86	June 15 94	June 22 93	June 29 92	July 6 54

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1958	80	86	88	84	84	86	—	—	—	—	—	—	—
1957	91	94	94	92	93	91	72	94	91	97	92	79	90

† *Percents of operation based on "Inch-Hours" reported on a 6-day basis.*

SUMMARY OF PAPERBOARD STATISTICS—National Paperboard Assn. Figures

ITEM	THIS WEEK ENDING July 5, 1958	LAST WEEK ENDING June 28, 1958	CUMULATIVE TO DATE Jan. 1 to July 5, 1958
% Activity	61%	89%	84%
	Tons	*Tons*	*Tons*
Total Production	193,815	277,429	6,875,721
Liner	64,465	86,443	2,244,718
Corrugating Material	34,662	41,210	1,021,348
Chip & Filler Board	3,596	5,422	126,817
Total Containerboard	102,723	133,075	3,392,883
Folding	29,629	54,428	1,349,246
Set-Up	5,434	10,622	273,182
Special Food Board	23,257	27,627	664,076
Other	32,772	51,677	1,196,334
Total Boxboard	91,092	144,354	3,482,838
Total Orders	*Tons*	*Tons*	
Received	229,248	272,519	
Unfilled End of Week	391,454	356,484	

For Top Wet Strength at Low Cost... UFORMITE 711

With all types of pulp—bleached or unbleached kraft, sulfite, or sulfite-groundwood combination—UFORMITE 711 can supply the wet strength you need at the low cost you want.

Paper makers prefer using UFORMITE 711 as their wet strength resin for other reasons as well. They've found that UFORMITE 711 is stable, can be shipped in drums or bulk, and requires no special preparation for use. It is being used in almost every grade of wet strength paper—from bags and butcher wrap to tissue and toweling.

Investigate UFORMITE 711—it may have the features you've been looking for.

UFORMITE *is a trade-mark, Reg. U.S. Pat. Off. and in principal foreign countries.*

write for detailed technical information

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UFORMITE 711

CATIONIC STRENGTH

A unique starch derivative develops strength in papermaking through its cationic properties. It's Cato, National's cationic wet end additive.

This extraordinary strength from Cato leads to unusual improvements. At one mill, with higher mullen and faster machine speeds. At another, with increased strength for tissue and a less costly pulp mixture. At another, with increased pick, fold and mullen and lower starch costs. And more, as can be seen from the Mill Trial Results at right.

Cato is chemically modified with cationic groups so that its molecule carries a positive charge. These cationic groups are attracted by relatively anionic cellulose fibers. *Stronger fiber bonding results!*

Cato increases retention of pigments, binders and other additives in addition to increasing strength. This is significant—as you can see in the Mill Trial on Offset Paper. Here, increased retention of clay and titanium filler indicates a 30% reduction in overall consumption of these materials.

Cato is highly effective with sulfite, soda and groundwood pulp as well as kraft and reclaimed stocks. It is virtually 100% retained in the sheet. Additions are small because of its effectiveness. We'd be glad to help you run trials. Just contact your nearest National office.

National
STARCH PRODUCTS INC.

750 Third Avenue, New York 17 • 3641 So. Washtenaw Avenue, Chicago 32 • 735 Battery Street, San Francisco 11

ACTUAL MILL TRIAL RESULTS

OFFSET PAPER

Procedure: Cato added at 0.5% on the fiber, replacing 3% beater starch. Run made on 70 pound uncoated offset grade which had a size press application of starch.

Mill Trial Results:

	3% Beater Starch	0.5% Cato
Basis Weight	70	70
% Ash	9.5	10.5
Ave. Mullen	35	42
Ave. Schopper Double Folds	35	44
Wax Picks	13/18+	14/18+
Opacity	94	95

Advantages: The efficiency of low concentrations of Cato lowers starch costs while increasing pick, fold and mullen. Too, Cato can reduce costs with higher pigment retention, as shown by data taken from another mill trial on offset paper. These figures were taken from a continuous run where Cato was introduced first, then replaced with the regular starch additive, and re-introduced into the system with 30% less titanium dioxide and 30% less clay added to the stock. In this, and other similar runs, better filler distribution and less two-sidedness have been noted.

Mill Trial Results:

	Concentration on Fiber	% Ash
Cato	0.5%	15-16%
Regular Starch Additive	2.0%	8-10%
Cato (with 30% less clay and titanium dioxide)	0.5%	14-15%

LETTERPRESS COATED STOCK

Procedure: Cato added at 0.5% on the fiber. Run made on a 50 pound machine coated letterpress sheet containing 13-15 pounds of coating per ream.

Mill Trial Results:

	REGULAR ADDITIVE		0.5% CATO	
	Lower Limit	Upper Limit	Lower Limit	Upper Limit
Basis Weight	47#	50#	49#	52#
Opacity	82	83	82.5	84.2
Mullen	16	20	20	23
Wax Pick	W6/5F	W7/7F	W7/7F	W9/8F
Total Ash	24%	30%	27.6%	34.6%
Base Stock Ash	7%	9%	9.2%	10.2%

Note the increase in ash content with Cato and higher strength levels at relatively higher ash contents. In an attempt to increase ash without loss in strength, more clay was added to the beaters and Cato was added at 0.7% on the base stock. Result:

	0.7% CATO	
	Lower Limit	Upper Limit
Basis Weight	48#	50.5#
Opacity	83.5	84.8
Mullen	16	19
Pick	W7/7F	W10/8F
Total Ash	33.8%	35.4%
Base Stock Ash	9.5%	14.9%

Advantages: Cato upgrades the base sheet so that both body stock pick strength and final surface pick after coating are improved. Economies are indicated by substantial increases in pigment retention.

as it lowers paper costs

KRAFT LINER

Procedure: Cato added at 0.5% on the fiber to the headbox. Run made on 47 pound test liner.

Mill Trial Results:

	Machine Speed	Ave. Mullen
Before Cato	980	109
With Cato (0.5%)	1060	120+

In another run on 42 lb. liner, Cato was added at 0.25% on the fiber to the headbox. At a constant machine speed of 1200 f.p.m., the mullen increased from 97 to 112.

Advantages: Stock with Cato is stronger and drains more freely on the wire. This permits faster machine speeds and greater production. On bag paper, tear increases have been noted when Cato is used to maintain tensile and mullen with less refining

SANITARY BOARD

Procedure: Cato added at 0.5% on the fiber. Run made on 60 pound bleached kraft container stock.

Mill Trial Results:

	Ave. Mullen	Bondage Range	Vanceometer @ 60 sec.	Pick
Cato (0.5% conc)	152	15-18	96	20/18
0.5% Natural Gum Type additive	147	13-17	93	18/18

Advantages: Cato aids in preparing base stock for size press or calendar stack applications at a more economical cost. In this case—a cylinder machine operation—interply bond and mullen were primary considerations.

TISSUE

Procedure: Cato added at 1% on the fiber. Run made on 10 pound industrial grade tissue.

Mill Trial Results:

	Ave. Mullen	Tensile MD	Tensile CD	Absorbency	Softness
Before Cato	7.8	505	212	17	27-18
With Cato (1%)	10.0	605	289	17	30-20
After Cato	7.8	516	255	17	27-21

Subsequent trials at this mill established an optimum concentration of 0.8% on the weight of fiber after an increase in groundwood content of the sheet.

Advantages: Cato's ability to strengthen without sacrificing absorbency or softness makes pulp changes possible that provide substantial cost savings. Cato is now being used on premium grades of toilet and facial tissues in concentrations of 0.25-0.5% on the fiber weight.

RESIN TREATED PAPER

Effect of Cato as a mordant for anionic resins added to the beater is illustrated by the following data taken from an evaluation where a waste groundwood furnish was employed.

Procedure: Cato added at 2% on the fiber to the headbox. GRS rubber latex added at 10% on the fiber to the beater. Alum added to stock after dispersion of resin.

Mill Trial Results:

Additive	% Alum	% Retention of Latex	% Wet Strength
10% GRS rubber	5	60-70	21
10% GRS rubber, 2% Cato	5	90-100	32
10% GRS rubber, 2% Cato	2	90-95	34

Advantages: Savings can be effected by using Cato to retain a higher percentage of resin in the sheet. Wet and dry strength factors are improved by greater resin retention, improved deposition of resin on the fiber, and by virtue of reduced alum addition.

CATO

CATIONIC WET END ADDITIVE

Du Pont know-how helps start up an efficient bleachery

• During the start-up of your peroxide bleaching unit, Du Pont technical men advise and train your key personnel on efficient bleaching techniques.

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ELECTROCHEMICALS DEPARTMENT
Peroxygen Products Division

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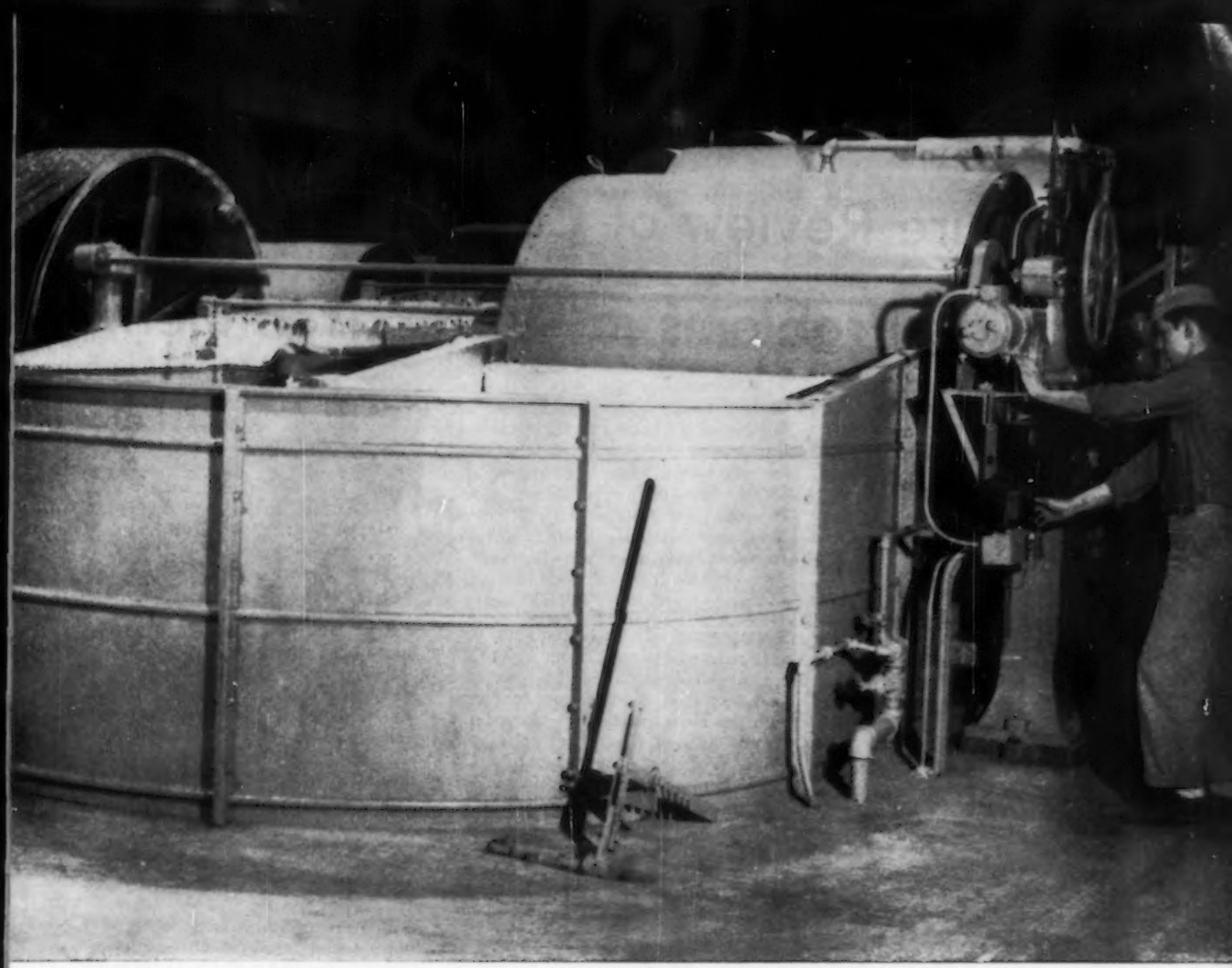

Stainless Steel keeps pulp clean

If you want bright, spotless paper, you have to keep the *pulp* spotless. In the beater shown here, that's a tough job. The pulp is like wet blotting paper. It can pick up the smallest speck of dirt, rust or corrosion. Yet the pulp stays clean because the beater is lined with Stainless Steel.

Unlike many other metals, Stainless Steel resists pitting and corrosion from chemicals used in papermaking. There is no pitting and there are no flakes of corroded metal to foul the pulp. And because the dense Stainless Steel surface is so easy to clean between batches, there's no danger of color carry-over to affect new colors.

When you install new equipment in your plant, specify corrosion-resistant Stainless Steel. It lasts years longer on the toughest jobs.

United States Steel Corporation – Pittsburgh
American Steel & Wire – Cleveland
National Tube – Pittsburgh
Columbia-Geneva Steel – San Francisco
Tennessee Coal & Iron – Fairfield, Alabama
United States Steel Supply – Steel Service Centers
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USS TRADEMARK

United States Steel

Literature Review of Color and Sulphide Problems in Water Treatment

J. S. McInnis, R. H. Mills and T. T. Collins Jr.

Hudson Pulp and Paper Co.
Palatka, Fla.

Treatment of the water from the two of the three supply sources of the Palatka, Florida mill of Hudson Pulp and Paper Corporation involves the two distinctly different problems of organic color and hydrogen sulphide removal.

Color of Water

The deleterious effect of color in process water for high brightness bleached pulps and papers has long been recognized. In these applications, TAPPI *(1)* and Miller *(2)* have recommended a color value of 5 p.p.m. maximum, whereas others *(3)* suggest even lower color as being desirable. It has been suggested *(1)* that water with high organic matter may have a harmful effect due to living organisms. Since the organic coloring material in water is a colloidal material, some of the most interesting phenomena of colloid chemistry have been observed in this phase of water treatment by numerous investigators.

Mention of water color in the range of 500-1000 p.p.m. was made by Whipple and co-workers *(4)* early in this century.

The removal of water color with magnesium hydrate in a softening operation at Grand Rapids, Michigan has been observed *(5)*.

Color an Acid

Hale *(6)* stated that color in water is due to a free organic acid and that if insufficient alum is added to form a proper floc, the color actually keeps it in solution. Neutralizing water after clarification and filtration was said to double the apparent color of the finished water. Experiments on Great Swamp water with maximum alum dosages reduced the color from 150 to 25 p.p.m. Alkali increased the color and acid decreased it while iron combined with the color radical was blamed for the difficulty of removal of color with alum. The fact that magnesium hydrate excess removed color in one instance *(5)* was cited as an indication of the acid character of color. Later it was shown *(5A)* that magnesium hydroxide particles are positively charged in the pH range of water treatment which accounts for the ability to absorb color.

Color a Colloid

Eventually electrophoretic measurements were made on the coloring material in water by Saville *(7)* and it was found to be a negatively charged colloid.

Race *(8)* consolidated the knowledge concerning water color in his pioneer article. He mentioned color of 300-400 p.p.m. in swamp water in southern U.S.A. and stated this is due to the humic acid studied by Odén *(9)*. The latter reviewed the literature on the subject of the humic acids and stated they are negatively charged particles. Race *(8)* pointed out that highly colored water of the Nile has a laxative effect but that from swamps in the U. S. does not. Race referred to the early work of Biltz and Krohnke *(10)* who showed that part of the organic color in water migrated to the anode, indicating a negative charge on the colloidal particle. He also mentioned other early investigators of the nature of color; such as, Rideal (11) and Catlett *(12, 12A)*. Race reviewed the work of Saville *(7)* who found:

(a) Color particles visible in Tyndall beam.

(b) Color migrated under influence of an electric current. Particles which wandered to the anode could be made to migrate to the cathode by adding an excess of positively charged ions. The exceptional positively charged color colloids were caused to migrate to the anode on addition of a base.

(c) Iron and aluminum ions precipitated color colloids but it was found necessary to keep the sulphate ion low to prevent stabilizing the negative colloid.

(d) A critical concentration was also found below which no precipitation occurred.

In 1916 Race designed a plant for the removal of water color using an electrical method. Brine was added to the water and it was passed between aluminum electrodes and then through filters. He claimed to reduce the water color from 40 to 3 p.p.m. without changing the alkalinity. The floc was found to contain considerable silica and some calcium along with iron, alumina, and organic material.

Clark *(13)* coated filters with iron and aluminum hydroxides (a coating called Schmutzdecke) and regenerated the coatings with caustic to remove color. This procedure reduced color by simple filtration.

Color Chlorination

It was found by Gammage *(14)* that raising the pH of coagulated water increased the color. Chlorine added with alum was said to improve color reduction. Weston *(15)* also suggested that chlorination of color bodies lowered the alum dosage and improved coagulation.

According to Newman *(16)*, alkali added with alum coagulant accentuated the color. However, by using cal-

Based on a paper presented at the March 14, 1958 meeting of the Southeastern Section of TAPPI in Charleston, S. C.

cium hypochlorite with the water to bleach it prior to coagulation, improved results were claimed.

The difficulty of treating the, at times, highly colored (20-350 p.p.m., ave. 151) and turbid (0-650 p.p.m., ave. 58) water of the Cape Fear River at Wilmington, N. C. has been outlined by Norcom *(17)* who recognized both materials as being negatively charged colloids. Since Catlett *(12)* had earlier found it necessary to split feed alkali used with alum in this plant, Norcom stressed the necessity for careful pH control with lime for coagulation and the necessity for adding sufficient alum for color removal. Treated water was 0-60 p.p.m. color (ave. 13) with a turbidity of 0-60 p.p.m. (ave. 4). Raw water of pH 5.4-7.8 (ave. 6.2) was coagulated in the range of pH of 4.0-5.6 (ave. 4.4) with an average alum dosage of 2.85 g.p.g. Norcom recognized that color removal from cold water is difficult since all alumina may not be coagulated and the filtered water may contain a slight opalescence of dispersed alumina and color which can be removed by a longer retention time.

Catlett *(18)* studied the coagulation of highly colored waters with alum. Water of color 200-500 p.p.m. was coagulated in the range of pH 4.3-4.8, which was very corrosive.

Acceptable drinking water should have a color of less than 15 p.p.m. according to Weston *(19)*. The observation was made that long time storage of water in reservoirs allows iron in the water to aid in discolorizing. Color bodies were said to be positively or negatively charged with some in solution not affected by electrolysis. Water at Exeter, N. H. was said to possess color evidently having a positive charge which was difficult to remove with alum unless the water was prechlorinated. Weston mentioned the use of carbon dioxide by Whipple *(20)* to increase the electro-negative character of color and hence the decolorizing power of a given dosage of alum.

Role of Alum

Miller *(20A)* has investigated the role of alum floc in removing organic color from water. He used three different methods of experimentation; namely, (1) dialysis, (2) cataphoresis, and (3) the action of various chemical reagents upon the "stability" of color, to determine if the humic acids were in true solution or colloidal dispersion. A "synthetic humus" was prepared by the condensation of sugar by an acid followed by dispersion in alkali and dialysis to remove excess electrolytes. Catophoresis showed the coloring material to be negatively charged and dialysis indicated the particles had colloidal dimensions. The increasing coagulating power for the color of various cations with increasing valence was shown to follow Schulze's rule. Miller found by cataphoretic measurements that potassium alum alone added to the color suspension gave best clarification at a low pH with the particle charge electroneutral. If alkali was added before the alum, clarification began nearer the neutral pH but more alum was required. Studies with aluminum chloride showed that at relatively low values of pH (4.4) where aluminum hydroxide was probably not formed, the aluminum ion rather than colloidal alumina precipitated the color bodies at electroneutrality. At a pH of 4.6 where colloidal alumina began to form, the floc was positively charged and the color was not removed. Above this pH value there was a zone of classification where the floc was again electro-neutral. At higher pH values (8.3) there was no clarification as the particles were negatively charged. The negative divalent sulphate anion from alum was said to prevent the formation of the positively charged floc in that case. Cape Fear River water color as well as tea and soil extracts were found to be similar to the "synthetic humus" in colloidal behavior. The author concluded that turbidity is best removed above pH 5.4 (where aluminum ion is not in solution) whereas color is best removed at values lower than this where some aluminum ion is present is optimum for formation of the "color floc." The possibility of "after precipitation" of alumina floc where the pH of the water would be raised after sedimentation or filtration was mentioned in cases where color would be removed by coagulation at low values of pH.

This is Section 2 of a two-part article on color and sulphide problems in water treatment. The first section appeared in the July 7th issue.

Filtering Color

An extensive study of the problem of water color has been carried out by Weston *(21)*. He stated that in addition to color as colloids, some is organic material in true solution. Several mechanisms of color removal were mentioned. Mississippi River water was partly decolorized by filtering through a porcelain filter. Storage in a lake was given as one natural process wherein color from two streams (100 and 196 p.p.m. respectively) was reduced to 9 p.p.m. In this case the iron-organic was stable in presence of oxygen in the water but in stagnant areas the iron was released and then when reaerated acted as a coagulant to carry the organic material to the bottom where it decomposed. Another means of color removal was slow filtration through a coating of iron and aluminum hydroxides on a filter bed. The coating was regenerated and freed of color by a caustic treatment. Coagulation with pH control and prechlorination was given as the most important commercial method for color removal.

The color of Great Dismal Swamp water from Knobb's Creek at Elizabeth City, N. C. ranges from 550-150 p.p.m. (ave. 350) and is negatively charged as shown by dialysis and cataphoresis *(22)*. For public drinking supplies, the color was to be reduced to 10 p.p.m. when possible. It was found that at least 10 p.p.m. of chlorine were required to affect color and that prechlorination did not aid coagulation. Experiments indicated that a primary and secondary dosage of coagulants before clarification was necessary. Tests run on water of 550 p.p.m. color showed the primary coagulants were most effective at pH 4.2-4.7 with the secondary flocculation in the range of pH 5.5-6.8. Alum and lime followed by aluminate produced a filtered water color of 7 p.p.m. but these were successfully replaced with chlorinated copperas and lime followed by alum and lime.

In order to duplicate the effect of color in coagulation studies, Peterson and Bartow *(23)* used tannic acid which shifted the pH for optimum coagulation with alum alone from 7.25 to 5.5 with 50 p.p.m. of tannic acid. The pH zone of coagulation was also narrowed and lowered by increasing amounts of the tannic acid.

Mom *(24)* claimed that the coagulation of humic matter in water by means of alum is effected by the simultaneous influence of hydrogen and aluminum ions and colloidal aluminum hydroxide. If free chlorine was present, a part of the organic material was apparently withheld from coagulating by the destructive effect of the chlorine upon the humus colloids.

Color Studies

Behrman, Kean and Gustafson *(3)* attempted to synthesize colored waters with tea and an oxidized alkaline pyrogallol solution, but these were not comparable to natural waters which contain several components. Tests on synthetic waters by electrophoresis showed color bodies to be negatively charged. The oxygen consumption of natural

waters was reduced by removal of color and color was increased by raising the pH of the water. Although chlorine oxidized part of the color of some waters, it was not effective on others. Activated carbon was found to be very effective in removing color, both with and without chlorination.

Behrman *(25)* also pointed out that a turbid water without color may be coagulated with alum over the pH range of 5.5 to 7.5 but if 30-300 p.p.m. of color are present, there may be a very narrow zone of floc formation around pH 4.8. Color removal by excessive chlorination followed by filtration through activated carbon to remove excess chlorine and filtration alone through carbon were mentioned but were said to be uneconomical. He pointed out that increasing the pH of the water after coagulation to reduce pipe line corrosion may restore part of the color of the water.

According to Miller *(26)*, flocculation of color colloids may be partially by aluminum-ion rather than alumina floc since coagulation is on the acid side below the range of floc formation. Miller *(27, 28)* prepared a survey showing that pulp and paper mills used water in the color range 0-150 p.p.m.

The work of several investigators in the field of removal of color from water has been mentioned by Hopkins *(29)*.

Treatment of Escanaba River water has been for color removal according to Johnston *(30)* who described a Dorr plant consisting of a flash mixer, flocculator, clarifier, magnetite filter, and clear well. The river drains swamp areas and the raw color varies between 30 and 200 p.p.m. Alum, 2.4 to 5.5 g.p.g., was added to the flash mixer and lime was added to the last section of the flocculator to adjust the pH to the desired finishing water value of 6.8 to 7.1. The statement was made that adding lime with the alum would "set the color in the raw water." Data given showed the minimum color of finished water to be approximately 12 p.p.m.

The use of the Infilco accelerator for color removal has been discussed by Kahn *(31)* who claimed sludge recirculation eliminates the need for coagulant aids and clay in some cases. It was said that some highly colored waters are best coagulated at pH 4.0. In a pilot plant operation, as high as 9.1 g.p.g. of alum adjusted with soda ash to give an optimum coagulation pH of 5.5 were necessary to reduce the color from 310 to 15-20 p.p.m. before filters. In the accelerator used for silica and magnesium reduction, precipitation at pH 10.5-11.0 reduced raw color from 17 to 2 p.p.m. In another installation, treating the water with lime to pH 8.8 reduced the color from 56 to 14 p.p.m. In a unit using Ferrisul at a coagulation pH of 4.0, the color was reduced from 185 p.p.m. to 8 p.p.m. but readjustment of finished water with caustic to pH 9.4 raised the color to 12 p.p.m.

Activated Silica

The effects of water color at the time of sizing in lowering the brightness of bleached paper 1 to 10 points has been emphasized by Noreus *(32)*. Because of the colloidal nature of the color and a similar negative change on pulp fibers, brightness loss on unsized pulp in the bleach plant amounted to only 1 to 3 points. The treatment of swamp water from the St. Louis River in Minnesota containing 150-400 p.p.m. color required 5 to 9 g.p.g. alum to form a floc. The equipment consisted of an accelerator connected in series and parallel with two settling basins followed by gravity filters. In this unit fresh incoming water and alum were mixed with recycled sludge. With alum alone, only 85 to 90 per cent color reduction was obtained so that 400 color raw water yielded 40 color finished filtered water. The 1 p.p.m. turbidity passing through the filters was said to account for 5 to 10 p.p.m. of the residual color. Since the maximum desired color was 25 p.p.m. the water at times had a deleterious effect on bleached pulp and paper. By adding activated silica (7-12 p.p.m.) after the mixing by the impeller in the draft tube, the floc was not broken up and the capacity of the unit was increased 100 per cent, with 95 per cent removal of color, practically doubled filter runs, and decreased filtered turbidity by half.

Further work by Klinger *(33)* with activated silica on Wisconsin River water of color 75-250 p.p.m. resulted in 90 per cent color reduction (somewhat better than with alum alone) in a system consisting of flocculators, and sedimentation basins followed by Anthrafilt filters. Alum (3.5 to 7 g.p.g.) was used with 3 p.p.m. activated silica and soda ash for alkalinity adjustment.

For removing color of 300-600 p.p.m. in water of 20 p.p.m. alkalinity, Harlock and Dowlin *(34)* suggested as needed, 1 p.p.m. Fe/100 p.p.m. color, 1 g.p.g. alum/50 p.p.m. color and sodium aluminate to provide 10-20 p.p.m. residual alkalinity in the settling basin. The release of color at high pH was mentioned.

Color in Softening

The treatment of colored (55-85 p.p.m.) water from wells for the City of Miami, Fla. has been discussed by Henry *(35)*. It was believed that color encouraged super-saturation and inhibited floc formation in lime softening. Removal of color floc with alum was impractical and uneconomical. An alum dosage of 8.5 p.p.m. was as effective as up to 137 p.p.m. and reduced the color by an additional 5 p.p.m. Activated silica (3 p.p.m.) was found to be the best coagulant aid but it did not aid color reduction. The color removed by lime softening was only 30-60 per cent with the lower efficiency at higher lime dosages. After chlorination and filtration the water color remained in the 18-28 p.p.m. range. Laboratory work showed that chlorine dioxide did not remove the color but ozone reduced it to 10-13 p.p.m.

A considerable discussion of water color problems has been prepared by Black *(36)*. The electrical charges on the various colloids as related to the removal of color have been responsible for electrophoretic devices for water purification but these have not proved practical. In addition, colloidal negatively charged color and turbidity particles may be coagulated by colloids or ions of opposite charge. Black outlined the mechanism of coagulation of color and floc removal based on three different types of actions. In the first step the positively charged trivalent aluminum or ferric ions neutralized the negative charge of the color body prior to the visible formation of floc. In the second phase, the partially neutralized micro-flocs in the acid range continue to neutralize negatively charged color particles. In the third stage the floc growth to visible proportions together with surface absorption of color and micro-flocs takes place and coagulation is achieved. The author pointed out that the proof for the theory of direct reaction of aluminum ion with color bodies is the fact that the calculated quantitative alkalinity reduction is not achieved when the alum dosage is added to a highly colored water. However, it was also said that it is not possible to arrive at an equation for the amount of a coagulant to use to remove a definite amount of color because of the great differences in color bodies and water analyses. Black discussed the treatment necessary for the removal of color from municipal supplies of three cities in Florida. In one case the color varied from 125-300 p.p.m. and alum dosages of 3.2-6.5 g.p.g. with a pH of coagulation of 5.4-5.6 reducing the color to the 10-15 p.p.m. range. In another system, the water was of such low alkalinity (10 p.p.m.) that the 200-300 p.p.m. (400 p.p.m. maximum) color was difficult to remove without an alkali to adjust the proper pH for coagulation. A third water was most

unusual in that lime could not be used for the coagulation adjustment but soda ash worked successfully. The problems of color removal in softening operations were also discussed. The statement was made that excess alkali in the softening operation, contrary to prior opinion, does not "set" organic color in water. For some colored waters, a high alkalinity may require so much alum to lower the pH to the proper zone of coagulation that it is in many cases more economical to remove the color and hardness by an excess lime softening operation followed by recarbonation. In one case, this resulted in reducing a raw water color from 55 to 15 p.p.m. In periods of rainfall when color is high and alkalinity low, softening treatment fails and coagulation is employed. It has been found almost impossible to treat surface water in the Florida Everglades which reaches 500-600 p.p.m. color, 500 p.p.m. total alkalinity, and 800 p.p.m. total hardness. At Miami, an attempt was made to lower below 10 p.p.m. the color of 22-30 p.p.m. resulting from softening well water of an initial color of 55 p.p.m. The negatively charged activated silica particles were found to be an excellent coagulant for the softener sludge. A secondary alum coagulation with 4 g.p.g. of alum was successful but the cost excessive. Ozone was investigated and a dosage of 2-3 p.p.m. reduced the color to 10 p.p.m. or below but was not considered feasible. The final treatment recommended for color below 10 p.p.m. was "break-point" chlorination of the treated water at pH 7.4-7.6 followed by aeration and stabilization with caustic soda.

Davidson *(37)* has described a plant, consisting of horizontal Permutit precipitators followed by gravity filters, for treating Rainy River water. Color of 40-80 p.p.m. was reduced to 2-4 p.p.m. by a chemical dosage of 2.25 g.p.g. alum, 0.5 g.p.g. lime, 1-2 g.p.g. clay, and 6-10 p.p.m. prechlorination. Direct chlorination alone was found to remove only about a third of the color and activated carbon only partially lowered the color. Activated silica was studied but its use abandoned when it showed no advantage over the clay and also shortened the filter runs.

The softening and color reduction of Mississippi River water in a Spaulding precipitator has been described by Janzig *(38)*. Some alum was used to aid in color removal. With a raw water color range of 13-190 p.p.m., it was found possible to reduce water color of 100 p.p.m. by softening to 30-35 p.p.m. Higher colors required pretreatment with alum. An earlier paper by Jensen *(39)* covered this plant at Minneapolis. With water of 130 p.p.m. color, clarification with 8 g.p.g of alum reduced the color to 55 p.p.m. and subsequent softening reduced it to 14 p.p.m.

The reduction of water color from 400 p.p.m. to as low as 10 p.p.m. with alum coagulation in a Permutit Spaulding precipitator has been claimed by Kneale *(40)*. Some color values of 100 p.p.m. were reduced to 1 p.p.m. after filters. Coagulant aids such as clay, activated silica,[1] Separan and HEC[2] were mentioned.

Color in Boiler Water

Nordell *(41, 42)* has mentioned color removal from water by coagulation with alum. He *(43)* stated that a water color of over 20 p.p.m. is high and that limits for boiler feed water, recommended by the New England Water Works Association, vary from a high of 80 p.p.m. at 0-150 p.s.i. to a low of 2 p.p.m. for pressures over 400 p.s.i. In a private communication, Nordell reported that limits for color in boiler water have been set by another publication *(44)*. (Author's note — apparently these color limitations are not based on the possible deleterious effect of color bodies on ion exchange resins of certain types.) Nordell pointed out that highly colored waters that are free of turbidity and have a low mineral content coagulate over a narrow range of low pH values and the addition of clay or activated silica is necessary. Chlorination exceeding the break point will not give sufficient bleaching and activated carbon is not generally used. Data on a wide range of colored water, before and after coagulation in "sludge blanket" precipitators, is given. An earlier paper by Nordell *(45)* discussed the Spaulding precipitator for water color reduction.

Nordell *(46)* pointed out that in measuring color, suspended matter should be removed by centrifuging since use of a filter paper will decolorize the sample to some extent. A table showed analyses of fifty samples of high-color surface water from various sources. Color ranged from 50 to as high as 1200 p.p.m. in the case of Great Dismal Swamp water. It was also pointed out that color is organic and not proportional to iron content. Data was also given to correct the misconception expressed in previous literature that the oxygen consumption is proportional to the color of water. It was shown that color values for some river waters may have a maximum ten times or more the minimum value. In treating colored waters with ferric coagulants at pH values above 9.0, it was found that the high pH tends to keep color in solution. Potassium permanganate was used in one test to decolorize Great Dismal Swamp water.

Color (5-80 p.p.m.) removal from the raw water supply of the Weyerhaeuser mill at Everett, Washington has been accomplished by a very low alum-caustic dosage according to Kotnik and Hansen *(47)*.

Stanton *(48)* has described the Ketchikan, Alaska water system where muskeg swamp water of 20-90 p.p.m. color was treated with alum and sodium aluminate to yield a filtered water of 1-2 p.p.m. color suitable for dissolving pulp. Approximately 0.5 g.p.g. of alum and 0.2 g.p.g. aluminate were used to achieve these results.

Color in New York State surface waters has been discussed by Weaver *(49)* along with procedures for removal.

The removal of humus substances from water with alum has also been outlined by Troëdsson *(50)*. Sartorius *(51)* described the Iron-Magno process for color removal in which a special filter substance based on granular calcined dolomite was used.

Sodium aluminate has been used by McCullough *(52)* to remove color of 190 p.p.m. and turbidity from Edisto River water supply for the City of Charleston, S. C. The normal treatment with 4.2 g.p.g. of alum gave a filtered water color of 18 p.p.m. but the addition of 0.5 g.p.g. of sodium aluminate reduced this to 2 p.p.m.

Waste Sulphite Liquor

A water treatment problem at the Oxford Paper Co. has been investigated by Cooper and Tifft *(53)*. Loss of brightness and variation in dye shade of paper were attributed to coagulatable color in water. No problem was involved in treating the, at times, inadequate supply from the Swift River but water from the Androscoggin River was found to contain color, turbidity, iron, and spent sulphite liquor. The spent sulphite liquor was measured colorimetrically using the Folin-Denis tyrosine reagent. Some interesting innovations were used in measuring color and turbidity of water. Using a Photovolt filter photometer, a procedure was developed for eliminating the turbidity effect from the measurement of color. In lieu of time-consuming jar tests, a so-called "flash mix" method followed quickly by filtering was used to study the effects of coagulants on color removal, etc. Proof of the theory that color is removed primarily in the flash mix period was given and it was indicated that prolonged contact with floc does not materially reduce color. Although the raw water color values were less than 30 p.p.m., there was considerable interference with coagulation due to spent sulphite liquor. Above

certain levels of spent liquor concentration, excess dosages above 20 p.p.m. of activated silica did not produce a good floc with as much as 10 g.p.g. of alum and 2-3 p.p.m. of Separan were found to be beneficial. Ground limestone was used as a weighting agent and calcium ions promoted a rapid settling floc. Tests were run with a pilot plant sludge blanket unit and the findings have been translated to full plant scale.

The yellow materials present in natural waters and called humins or tannins were shown by Shapiro *(53A)* to consist of ultraviolet fluorescing dicarboxylic hydroxy aliphatic acids of molecular weight approximately 450. He claims they may be chelating agents which keep iron in solution. Using chomatographic procedures of analysis, the author studied the coloring materials in various lake waters.

In recent years the negatively charged, colloidal sols of activated silica have been the most widely used coagulant aid for water treatment, particularly where color removal was involved. Recently, however, there has been considerable activity in the application of organic polymers to these problems, for industrial water supplies.

Organic Coagulants

The difficulty of coagulation of water containing organic color has been pointed out by Kemmer, Houser, Steeper, and Dickerson *(54)*, who have studied a coagulant aid, hydroxyethyl cellulose (HEC), manufactured by Hercules Powder Co. This material is prepared for addition to water by dissolving it in caustic. HEC dosages of approximately 0.5-1.0 p.p.m. added after the alum coagulant allowed coagulation at higher pH values with a reduction in alum and clay dosage. This reduced the amount of alkali needed for post-clarification pH adjustment of the water.

Hercules *(55)* has also found that CMC (carboxy methyl cellulose) is equivalent to HEC as a coagulant aid. It is said to be anionic in the pH range used for water clarification and is acceptable for use in drinking water.

Kirkconnell *(56)* of National Aluminate Corp. has discussed cationic polyelectrolyte coagulant aids that were found to be very effective on clay particles and for color removal. He suggests that color (composed of gallates, humates, tannin, etc.) may be removed by two ways—adsorption on a material; such as, bentonite clay; and by neutralizing the negative color particles with a suitable cation; such as the aluminum ion. It was said to be possible to form a positively charged stable color floc by overdosing with the cation. Johnson *(57)* has also described tests with polyanionic and polycationic polymers and starch as coagulation aids.

Bulletins *(58)* describing coagulant aids marketed by Hagan Corporation have been issued. These materials are said to be mixtures of polyelectrolytes and bentonitic clay that are non-toxic. Most efficient removal of color at pH of 4.5 is noted and the use of more coagulant to remove color at a high pH as compared to the optimum value is mentioned. Water is said to be more difficult to decolorize if the pH is raised with alkaline agents to give the desired pH level for coagulation before coagulant is added to the water.

Separan, a non-ionic organic product of The Dow Chemical Company, has generated widespread interest as a coagulant aid in many industrial fields. Ryan *(59)* and Dow Chemical Company *(60, 61)* have described tests on a sludge blanket-type water clarifier where the replacement with 0.5 p.p.m. Separan for 10 p.p.m. of activated silica allowed more than double the water throughput of the system with a reduction in alum requirements. Some very interesting results were obtained on a plant using lime and ferric sulphate to clarify water for injection in oil wells. Separan was also shown to be effective as a coagulant aid in a lime softening process. Rice *(62)* has discussed the theoretical mechanism of coagulation as related to the adsorption of ions on colloidal particles and the bridging action between particles by long chain organic polymer flocculants which also have active cationic groups at various points on the polymer chain attracted to several colloidal particles at a time. Rice stated that soluble color in water is not as completely removed by these organic flocculants as with alum, and cites an example where 15 p.p.m. of Nalco #600 used on a water of 100 p.p.m. color and 40 p.p.m. turbidity at pH 5.0 allowed a residual color of 20 p.p.m. whereas 38 p.p.m. alum reduced the color to 5 p.p.m. Organic amines, such as Armour and Co.'s Arquad 2HT, were substituted 0.2-0.5 p.p.m. for as much as 20 p.p.m. of alum in cases where turbidity, rather than soluble color was involved. Organic flocculants alone were shown to be effective where the turbidity involved was not colloidal. Using soluble lignin as water color, it was shown possible to reduce 45 p.p.m. color to about 5 p.p.m. using 90 p.p.m. bentonite clay and 15 p.p.m. of Nalco #600 as the flocculant. Rice has also described organic flocculation aids; such as, hydrolyzed starches, that are used in the mining industry. Other aids listed were the organic non-ionic (Separan) or anionic (sodium polyacrylate) polymers. American Cyanamid's Aerofloc 3000 was also mentioned. These materials added in concentrations of 0.1-1.0 p.p.m. were shown to give remarkable advantages in several applications using alum or iron coagulation by toughening the floc and increasing the floc growth and settling rates. It was indicated that disadvantages can result if the polymers are not added after the primary coagulant floc has already formed. When organic polymer aids are used to toughen the floc, the floc remains in a thin layer on the filter surface and causes a more rapid increase in head loss with more frequent and longer back-washing than results from the use of activated silica. The general statement was made that in several water treatment plants 0.5 p.p.m. of Separan replaced 5.0 p.p.m. of activated silica.

Theory of Coagulant Aids

An earlier paper by Rice *(63)* outlined the colloidal mechanisms involved in the removal of color and turbidity by coagulation. In addition to materials previously mentioned *(62)* Rice listed Monsanto's Lytron X-886 as a coagulant aid. The concept of bridging between suspended floc particles to explain the aggregating properties of the large molecules of these organic polymers was discussed. The involved theoretical discussion presented is of interest as a fundamental outline of the subject of coagulation aids.

The use of polyelectrolytes, modified starches, glue, etc. for coagulation in the ore-dressing and coal-washing industries has been reviewed by Cohen, Rourke, and Woodward *(64)*. In tests with various polyelectrolytes under code letters using alum as the primary coagulant, sodium lignosulphonate (Orzan 5) was used to simulate color in water. A cationic polyelectrolyte allowed coagulation in the presence of the lignin solution where alum alone caused no appreciable clarification. The ability of the alum to form a floc was decreased by increasing the lignin compound. Thus the cationic polyelectrolyte was shown to be effective on negatively charged particles. The authors note that Middleton *(65)* found that lignin compounds in water require increased alum dosages and result in a fine, slow settling floc if a coagulant aid is not used. Middleton and others *(65A)* have studied means for analysis of organic materials in water that affect coagulation.

A number of bulletins have been issued by suppliers of the various coagulant aids, polyelectrolytes, and organic coagulants. The Armour Chemical Division *(66)* has made some pre-

liminary evaluations of Arquad 2HT as a flocculant for turbid surface waters in conjunction with and substitution for the high molecular weight polyelectrolytes from other manufacturers. Bentonite clay and soluble lignin color were used to simulate natural water color and turbidity. It was found that 0.2 p.p.m. of Arquad 2HT could be substituted for 20 p.p.m. of alum when used in conjunction with 0.5 p.p.m. of Separan, Aerofloc 3000, etc. and that 0.5 p.p.m. of Arquad 2HT did as well as when the polyelectrolyte was used. Another compound of interest as a primary coagulant or aid is Union Carbide's Polyox *(67)*.

Lytron X-886 and DX-848-41 resins produced by Monsanto *(68)* are anionic polymers suggested as flocculant aids. They have a number of bulletins covering various applications of these materials.

Flocculants, Good-rite K-720, K-720S, and K-721S are marketed by Goodrich *(69)*. A number of flocculants developed by American Cyanamid *(70)* are described in their various bulletins and the paper by Swift *(71)*.

It is apparent that the considerable activity in the field of coagulants, aids, and polyelectrolytes by numerous manufacturers will open new horizons in water treatment for the removal of color and turbidity. Not only does the possibility for improved quality of water appear but these materials will undoubtedly aid in greater throughput in existing plants, thereby increasing capacity without further capital investment in many instances.

Considering these studies on water treatment, color removal can be said to be one of the more complex problems of colloid chemistry along with the various phenomena of flocculation and coagulation. In order to understand how color and the other materials; such as alum, lime or other alkalies, coagulant aids, various ions, etc., react in the water treatment system, it would be necessary to consider the various colloidal machanisms involved. However, it is without the scope of this paper to review the subject of the colloidal chemistry of alumina and its role in water treatment.

Sulphide in Water

The problem of hydrogen sulphide in water occurs in many cases where mills obtain supply from wells. The most widely used procedures for destroying the sulphide have been aeration and/or chlorination. From the standpoint of corrosion in the paper industry and the undesirable taste and odor in potable water supplies, it has been necessary to eliminate the sulphide.

An early investigator of the problem, Simons *(72)*, allowed a flowing cell to discharge in thin sheets of water over a disc. Sulphur bacteria grew in the sump at first but quit when a second disc installed reduced the sulphide to a low level.

Application of aeration to remove as much as 20 p.p.m. of sulphide was claimed by Gillespie *(73)*.

One group of investigators *(74)* found that an inert gas passed through water removed practically all of its sulphide within ten minutes at pH 4-7. However, at pH 10-13, very little sulphide could be stripped out.

Derby *(75)* determined that the well water supply for Bevery Hills, California contained 1-20 p.p.m of sulphide. It was found that spraying the water did not give complete reduction of sulphide immediately (only reduced 6-10 p.p.m down to about 4 p.p.m.) and the element of retention time was found to be very important because after four hours lower readings were obtained. An attempt was made to bubble air through the water but this gave poor results, probably due to the alkaline water not releasing the sulphide. Eventually Beggiatoa growth took over the aeration basin. Heavy chlorination of the water and frequent mechanical cleansing of the basin did not solve the taste and odor problem. Eventually a lime softening plant was built which also included alum coagulation after an aeration tower. Although Beggiatoa filled the aerator and basin, it did not carry through the softener and filters.

The growth of Beggiatoa in water mains has been discussed by Langlier *(76)* who claimed it causes more objectionable taste and odor than hydrogen sulphide. He said the aeration drives off part of the sulphide and oxidizes some to free sulphur which micro-organisms in the distributing mains can convert back to sulphide.

Aeration

In a study of aeration by diffusers in tanks, Roe *(77)* arrived at a power requirement of 1.0 Kw. installed per million gallons of water per day. Aeration of the water supply at Victoria, Texas reduces the hydrogen sulphide content from 19.0 to 0 p.p.m. He pointed out it is less expensive to aerate in a basin than to pump the water to the top of an aeration tower.

For an odor-free finished water, Flentje *(78)* used a spray nozzle aerator followed by 1-2 hours retention of water in a tank. He pointed to the use of the air lift for pumping wells as a means for removal of sulphide. Using compressed air in the ratio of about 0.16 cubic feet per gallon of water followed by retention of the water for about fifteen minutes, most of the sulphide was removed. It was pointed out that aeration of well water having practically no dissolved oxygen increases the corrosiveness of the water due to addition of oxygen.

Pope *(79)* has suggested spraying water through nozzles to remove hydrogen sulphide.

Nordell *(41,42)* has noted corrosion difficulties on papermaking equipment due to hydrogen sulphide in the water and mentions removal of sulphide by aeration, chlorination, and degasification with flue gas followed by aeration.

Sulphide in Mill Wells

The unique water treating plant at the Rayonier mill at Fernandina has been described by Nordell and Richheimer *(80)*. Deep artesian wells supply a colorless water of about 3.6 p.p.m hydrogen sulphide. Pilot plant tests with various designs of coke-packed and slat-type aerators showed that simple aeration would remove only about 50-60 per cent of the sulphide. Final design was for a 30 M. G. D., 2-chambered degasifier. The top chamber of the degasifier was filled with superimposed slat trays over which the water flowed countercurrent to a stream of flue gas which had been scrubbed in a lime-stone-packed tower. The carbon dioxide lowered the pH of the water and liberated hydrogen sulphide. The water then flowed to the lower slat-filled chamber where natural draft brought about aeration which removed the carbon dioxide. Starting with a raw water of 3.5-3.7 p.p.m of hydrogen sulphide and 8-20 p.p.m. of carbon dioxide, this degasifier produced water with a residual of 0.1-0.3 p.p.m. of sulphide and 9-13 p.p.m. of carbon dioxide. (Authors' note:—It is understood that in operating the degasifier at Fernandina the pipes carrying the flue gases were corroded soon and the carbonation stripping was stopped. However, aeration in the tower followed by retention in the basin has proved to be sufficient and the removal of the last traces of sulphide by Beggiatoa has eliminated the necessity for the treatment with flue gases or chlorination of the water. A rough estimate of the planking used in this type of aeration tower for removal of sulphide of this concentration runs approximately one square foot per gallon per minute when a sufficient growth of sulphur bacteria is present.)

In the Jacksonville Mill of National Container Corporation, Richter and Lammers *(81)* found well water containing 1.6 p.p.m of sulphide caused corrosion and shortened the life of paper machine wires. The three schemes considered for sulphide removal were, (a)

Reduction of pH to 4.0 with sulphuric acid followed by aeration and readjustment of pH to 8.0 with alkali (b) Addition of copper sulphate with pH control (c) Chlorination. Of these suggestions, the last was adopted. (Author's note:—In later years aeration of the water was also used to remove part of the sulphide. This was done by spraying the well water into a small pond carrying a heavy growth of sulphur bacteria. This procedure reduced the sulphide from 1.8 to 0.1 p.p.m with a chlorine demand of 0.8 p.p.m. Aeration is a very common practice in many domestic water systems using well water containing hydrogen sulphide.)

In one of the few instances where the role of sulphur bacteria was recognized as removing hydrogen sulphide, water gas or coke oven gas were passed through peat so that the bacteria could oxidize the sulphide. This was reported by Appleby and Hughes *(82)*.

The removal of sulphide by filtering water through beds of pyrolusite has been claimed by Vekhotko *(83)*. Aeration following chlorination has been suggested for sulphide removal by Crane *(84)*.

Kovrov *(85)* removed hydrogen sulphide by spraying water into a partial vacuum, with or without applied heat. Petersen *(86)* patented a vacuum degasifier using coke packed trays with an absorber to the gas released. The use of a charcoal absorbent to be regenerated with hydrogen peroxide has been patented by Griswold *(87)*.

Murzaev *(88)* recognized that both autotrophic "sulphur" bacteria and free oxygen play a role in oxidizing hydrogen sulphide to sulphur and finally to sulphuric acid. Parker and Prisk *(89)* raised the question of the possibility that bacteria other than Beggiatoa may convert sulphide to sulphuric acid.

Resins for Sulphide Removal

An article *(90)* states that it has been common practice for many years to remove hydrogen sulphide from well water by aeration, most effectively at low pH values. The reduced pH values convert most of the sulphide to hydrogen sulphide that can be removed by aeration. In addition, stripping with carbon dioxide from flue gases, chlorination, and ion exchange materials have also been used. Where carbonation is used, aeration follows to remove the carbon dioxide. Aeration following pH reduction with mineral acid is also said to be practical. However, these treatments were said to require final chlorination to remove the last traces of sulphide. Recently highly basic resins for use in anion exchangers have been successfully used for sulphide removal. Other descriptions *(91)* of aeration processes have been given.

Some literature *(92, 93)* has been issued on sulphide removal by anion exchange using Amberlite resins. A recent personal communication from the manufacturer of these resins states that they are not in production for sulphide removal at present.

Thompson and McGarvey *(94)* have remarked on concentrations of as high as 70 p.p.m. sulphide in water and that 0.5 p.p.m. gives a noticeable odor. They state that aeration alone reduces the sulphide to 1-2 p.p.m. with the final removal accomplished by chlorination. This treatment results in free sulphur which has to be removed by coagulation and filtration in some cases. The use of a strongly basic, amine - type anion-exchange resin (Amberlite IRA-140) for sulphide removal was discussed and the exchange capacity of this resin for sulphide at different pH levels is given. The removal of sulphide by manganese zeolites or activated carbon was discussed.

Brown *(95)* has studied aeration towers for the removal of carbon dioxide and noted that aeration also reduced sulphide.

In his extensive discussion of the theoretical principles of aeration, Haney *(96)* pointed out that aeration of water drives off the carbon dioxide more readily than the hydrogen sulphide, thus raising the pH of the water and shifting the ionization equilibrium toward the formation of more sulphide which cannot be removed by aeration. The sulphur produced by aeration must also be removed to prevent further water problems.

Studies on Sulphide Stripping

Powell and von Lossberg *(97)* have extensively studied the removal of hydrogen sulphide from well water, necessitated in some instances because of sulphide attack on greenstand zeolites and metal. They outline the two mechanisms involved in sulphide removal by aeration as stripping of the gas and oxidation of the metallic sulphide to sulphur at pH values above 7.0. It was found necessary to remove the latter by filtration. A summary was given of the pilot plant work carried out by The Permutit Company *(80)* on carbonation and stripping by aeration of well water to remove hydrogen sulphide. Studies on a large aeration tower at Jacksonville, Florida were also made at various flow rates to determine the sulphide removal efficiency on well water containing 2 p.p.m. of H_2S. It was found practical to remove part of the sulphide by aeration and the rest by chlorination. Degasifier towers were designed to be 16 feet high with a square foot of cross-sectional area for every 15 g.p.m. and an air flow of 7.5 c.f.m. per g.p.m. of water. A description was given of pilot plant design and studies for removal of 30 p.p.m. H_2S from another well supply and a procedure for measuring the sulphide content of water by an iodometric method. At relatively low water flow rates through the aerator it was possible to reduce the sulphide to as low as 1 p.p.m. H_2S but considerable free sulphur was released. The effect of variation in air flow on lowering of sulphide was found to be negligible at 2-10.5 c.f.m./g.p.m. It was also found that carbonation of high alkalinity waters for sulphide removal is not practical. Aeration alone was responsible for a rise in pH of the raw water. A further study showed that lowering the water pH to 4-5 range with mineral acid gave a large increase in the sulphide removal.

The actual results on sulphide removal were compared with the theoretical values calculated from the work of Pomeroy *(98)* on sewage. It was stated that values of vacuum deaeration for sulphide removal follow the theoretical curve very closely. Chlorination tests showed that the sulphide was oxidized to sulfuric acid by the chlorine. The relationship of 4 p.p.m. H_2S causing a 30 p.p.m. Cl_2 demand was found to hold closely to the theoretical value for the oxidation-reduction reaction.

Negano *(99)* has shown that in sewage treatment chlorine oxidizes hydrogen sulphide to sulphate rather than to free sulphur and that the ratio of chlorine demand to sulphide is 8.87:1 as required by theory.

Chlorine Demand

Discrepancies in the literature concerning the amount of chlorine required for sulphide removal in water treatment have been recognized by Black and Goodson *(100)*. They found that there is primary oxidation of sulphide to sulphur and a secondary oxidation of a portion of the sulphur to sulphate. The overall oxidation to sulphate occurred almost completely at pH of less than 5 but decreased with increasing pH. A maximum in the rate of the secondary oxidation of free sulphur to sulphate was found to occur from pH 6.5 to 7.3.

Wells *(101)* has reviewed the problems of sulphide in water for municipal supply. He lists aerators on elevated tanks, atmospheric aerators, pressure tank aerators, chlorination, and ion exchange as methods for sulphide removal. It was pointed out that most artesian waters in Florida contain 1-4 p.p.m. sulphide and that if the pH is raised to 9.0 or higher most of the odor and taste will disappear due to conversion of hydrogen sulphide to alkaline

sulphide. Studies on a number of aeration systems showed 30-45 per cent sulphide removed by the aerator with the rest disappearing during retention in a reservoir. Slat tray aerators in use are designed for 2.1-7 g.p.m./sq. ft. One aerator designed for one g.p.m./sq. ft. operating at one g.p.m./sq. ft. gave 45 per cent sulphide removal whereas one designed for 3.5 gp.m. but running 5 g.p.m./sq. ft. gave 35 per cent sulphide removal. Retention for 1¼ hours in the case of the latter reduced the sulphide to 0 p.p.m. Aerator trays are usually 1″x3″ cypress boards with ½-¾″ separation with trays 12″ apart and the boards running at right angles on alternate layers. In small pressure tank aerators sulphide removal was found to run 35-85 per cent and this system was not as adequate as the other type. Wells pointed out that the bacteria reduces the sulphide and that this system of treatment is used in one industrial plant. He also found that chlorine demand tests on supposedly sulphide-free waters yield higher demand values than would be expected if complete oxidation of the sulphide has occurred. For domestic supply, aeration-retention should be followed by chlorination.

Sulphur Bacteria

The transformation of sulphur by microorganisms has been thoroughly reviewed by Starkey *(102)*. For the oxidation of sulphur compounds, which would cover water supplies containing hydrogen sulphide and / or sulphur, Starkey lists photosynthetic sulphur bacteria (anaerobic, require light), colorless sulphur bacteria with relatively large cells sometimes filamentious (aerobic), the colorless bacteria of the genus *Thiobacillus* (mostly aerobic) and others. Beggiatoa appears to be the predominant species found in sulphide water being aerated.

Nordell *(103)* has published data on samples of sulphur waters from springs and wells, ranging from 0.4 to 70 p.p.m. of H_2S. Most of the samples contained less than 5 p.p.m. of sulphide and as little as 0.5 p.p.m. is said to be noticeable in drinking water. Aeration of the various water samples did not remove more than about 10-63 per cent of the sulphide present as the carbon dioxide was also driven out of the water. Part of the sulphide remained as alkaline sulphide rather than hydrogen sulphide. Aeration was particularly ineffective on highly alkaline waters and it was found necessary to use flue gas for carbonation of the water to lower the pH to facilitate stripping of the hydrogen sulphide. It is pointed out that oxidation of sulphides by dissolved oxygen is a slow process but that the sulphur bacteria growing in aerators and basins play an important role in reducing the sulphide content of the water (by oxidizing the sulphide to free sulphur) to such an extent that only slight post-chlorination is necessary. The requirement of 8.32 p.p.m. of chlorine to oxidize 1 p.p.m. of H_2S to the sulphate is also mentioned. A discussion of degasifiers for sulphide removal is also given.

From this information, it can be seen that the role of the sulphur bacteria in water treatment for sulphide removal may be greater than has been generally realized, and that part of their effectiveness has been credited to aeration. Undoubtedly this consideration will enter into future plant design in some instances.

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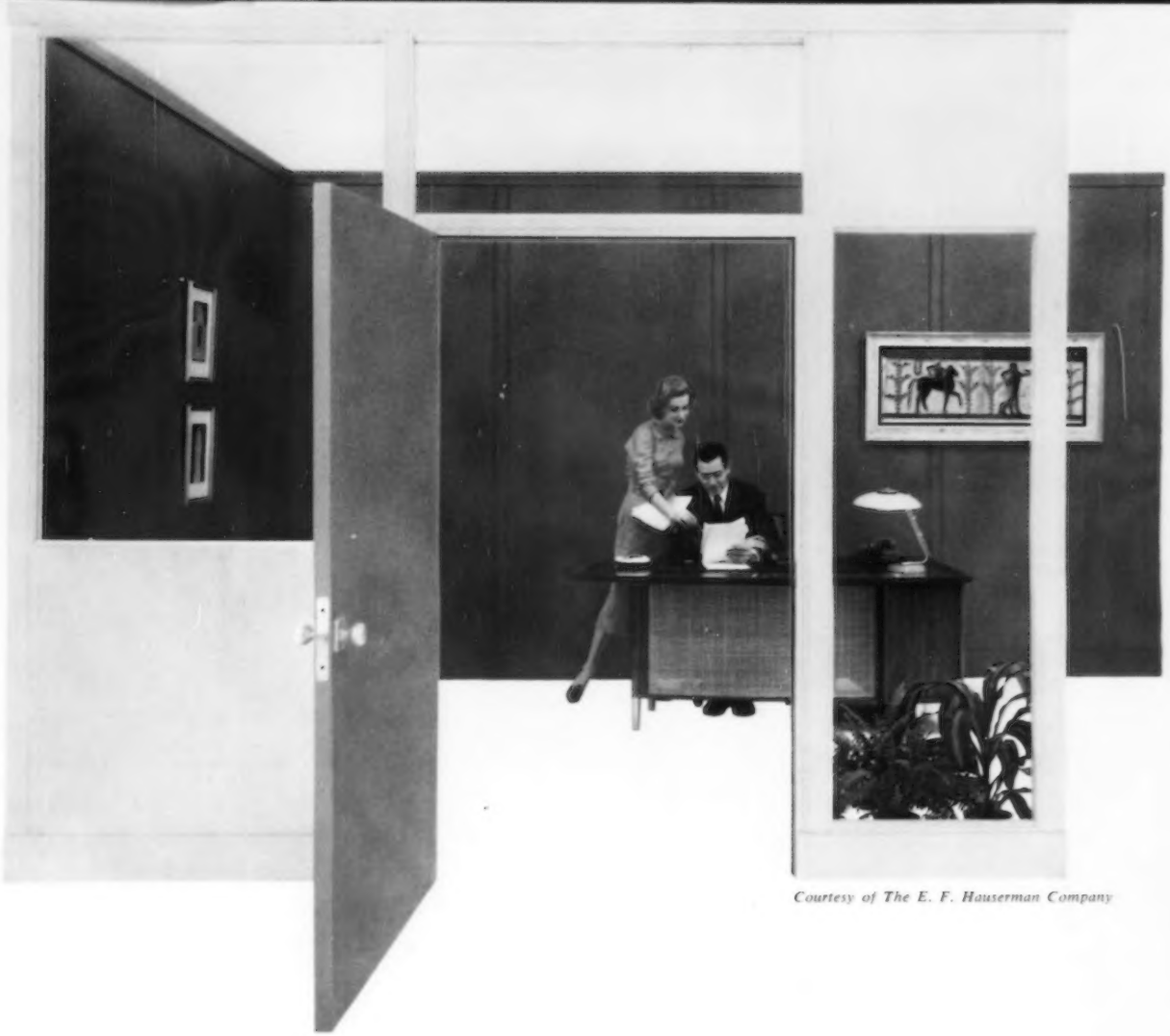

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Finishing Room — Stepchild of the Paper Mill

Harry Rimberg

H. Rimberg & Associates
Finishing Room Consultants
550 Fifth Ave.
New York 36, N. Y.

Finishing operations, particularly when sheeting and trimming are involved, are often the least efficient in the whole mill. Opportunities to reduce labor and spoilage and to increase production with existing equipment are readily available.

Within the past 20 years, the paper mill has undergone numerous changes, many of them with the aim of achieving greater production. Making paper is no longer a trick dependent on the skill of the old time itinerant paper maker, but is now a science. The furnish for every imaginable sheet is readily available, and paper machines have been designed to make paper better, wider and at speeds up to 2500 feet per minute.

With more and more paper being made, most finishing rooms which have always been the bottleneck in the mill, now require a complete overhauling of equipment and methods to maintain pace with the rest of the mill. In mills where most of the production is in jumbo rolls for newspapers, magazines or roll converters, the problem of keeping up with paper making has been comparatively simple. High speed rewinders were designed with automatic tension devices, pneumatically controlled slitters, and other push button controls so developed and perfected that roll production in the finishing room is no problem and the operation is profitable. Naturally old equipment had to be completely discarded and replaced with new machines, specifically designed to take on the extra load. Purchase of such capital equipment was never questioned, new machines were indicated and new machines were bought.

Sheeting

In those mills turning out sheets, increased paper production has presented a serious problem. Sheet cutting for many years has been a service thrown in by the mill, for which there was a nominal charge, and on which the mill has always lost money, but sheeting is a necessary evil and as such endured. Over a period of 20 years this nominal charge has increased from $7 a ton to $20 per ton, with the mill still losing money at $20. Spoilage has increased and the finishing room bottleneck has grown worse. Since most finishing room operations revolve around the sheet cutters, this phase requires the greatest study.

Most of the old sheeters were built to operate at speeds up to 250 f.p.m. and were wide enough to accommodate the full trim of the paper machine, and sheeting directly from the paper reels as they come from the paper machine rewinder. The theory has been that if from four to ten paper reels from a paper machine running 750 f.p.m. were loaded on a back stand and cut by a sheeter running 250 f.p.m., the sheeting operation would never fall behind. In theory this should have worked but after these rolls were cut and examined on skids before shipping, the bad and imperfect paper had to be sorted out, good paper recounted and examined before trimming. To accomplish this a crew of sorters and counters were added to the staff of every finishing room. Some effort was made in many mills to eliminate sorting by rewinding original paper reels and examining paper for imperfections and by slabbing off bad sections, attempting to deliver only good paper to the sheet cutters. Another step in the right direction was to examine and slit paper reels into narrow jumbo rolls and thereby salvaging that part of the original reel containing good paper. This method eliminated much sorting and cut down spoilage. Rewinding, examining and slitting took time and slowed up production.

Improved Sheeting Equipment

Now attention turned to equipment and the problem of greater machine efficiency. In order to get greater speeds out of the old sheeters, originally made with babbit bearings, these bearings had to be replaced with anti-friction roller bearings to stand up under speeds four times greater than originally intended by the manufacturer. Increased speeds created other problems and to overcome these the major single improvement in modernizing the finishing room, the overlapping layboy, was developed. By overlapping cut sheets on delivery tapes a continuous stream of paper was delivered onto a pile jogger under perfect control (Figure 1).

Many improvements to the overlapping layboy were developed. There are now layboys that permit piling of sheets on one skid while another skid is being prepared to receive paper when the first skid is fully loaded. Another layboy method of continuous operation extends a set of fingers when a skid is fully loaded to accept paper while the loaded skid is removed and an empty skid raised to the fingers holding the interim pile and then the fingers lowered and withdrawn until needed for the next skid. Now in the state of development is a layboy which will deliver six-inch lifts of paper directly from the layboy onto a conveyor feeding a guillotine trimmer. This method will eliminate duplicate handling of piles and is a further step in attaining some measure of automation.

In many mills, sheeting and production was increased and down time decreased merely by elevating sheet cutters and layboys another 36-inches so that higher stacks of paper were produced, thus reducing the number of skids to be handled. Revolving back stands have been developed for quick changing of roll sets (Figure 2). Separate back stands which are moved into place on tracks now permit loading of a set of rolls while another set is being sheeted. Higher

skid loads and extra back stand equipment will increase production as much as 50 per cent. Shaft handling has always been a problem and recently a shaftless back stand has been perfected that eliminates cumbersome handling, saves storage space and costly chuck replacement. All in all, the machinery manufacturer has met the challenge to increase production and modern finishing room equipment is today geared to keep pace with the paper machine.

Reducing Spoilage

However the finishing room problem, even with new equipment is far from being solved. Spoilage at most mills still runs from eight percent to twenty percent and with each one percent of spoilage in a 100 ton per day mill costing a mill $75,000 annually, on medium price printing grades, this can mean the difference between a profit and a loss. It is deplorable that after paper is made and made well, it enters the finishing room and in a few days returns to the beaters as "broke." It is not "broke," but pure and simple spoilage. How often has a mill official observed rolls being loaded on sheeter back stands and in handling the rolls are jostled with resultant side cracks developing. The loader will calmly take out his slabbing knife and with three cuts and a quick pull, strip off an inch or two of good paper. Each inch of paper on a 120-inch wide roll, 42 inches in diameter weighs about 500 lbs. With the entire roll weighing 5000 lbs. 10 percent spoilage has already occurred with more spoilage to come as the sheet is fed into the cutter. We hope to discuss this problem in detail in a later article.

Slitter Dust

Before the set of rolls are properly aligned and adjusted to remove wrinkles and slack tensions another two percent spoilage occurs. On printing papers, the end still is not in sight. When wide rolls are slit on the sheeter because of the multiplicity of sheets being slit, each with different tension, slitter dust will always result. Many mills take extra precautions to cut down slitter dust by carefully honing slitter knives at each roll change and are careful in setting slitting depths and angles, but if slitting is done on the sheeter, slitter dust to some degree will develop, and if air is used to deliver the sheets to the pile jogger this slitter dust is blown onto the entire surface of the sheet. When this paper with its slitter dust is run through today's presses it causes extra wash-ups, "hickeys," uneven printing of solids and dirty fountains. Thousands of dollars in claims due to slitter dust are paid yearly and more thousands

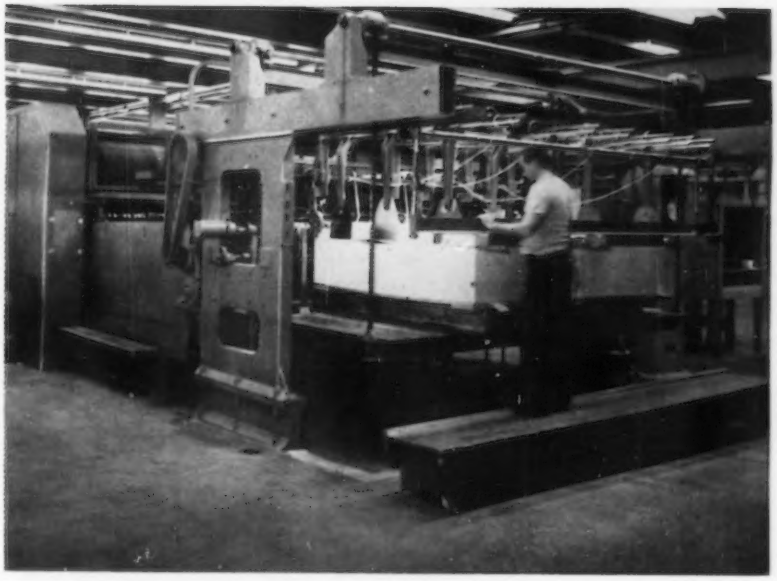


Figure 1—Overlapping layboy has been major single improvement in finishing room. By overlapping cut sheets on delivery tapes a continuous stream of paper is delivered onto pile jogger under perfect control.

lost by declaring paper as job lots because of unnecessary slitter dust. In one mill, where slitter dust resulted in creating bad will with the printers, we were consulted and immediately advised management that the only way to avoid slitter dust is to sheet from narrow rolls. This suggestion created much opposition, since it meant handling three times as many rolls, cutting special cores, estimating trims, etc., etc. However, we prevailed and were allowed to supervise both methods of cutting. First we cut two sets of six rolls each 120 inches wide. This lot of 50,000 lbs. required one boss cutter-man, two helpers, one broke hustler and three girls at the layboy; complete running time with loading and unloading was seven hours and spoilage was 12 percent. Next we ran three sets of eight rolls each 60 inches wide, also giving 50,000 lbs. This latter

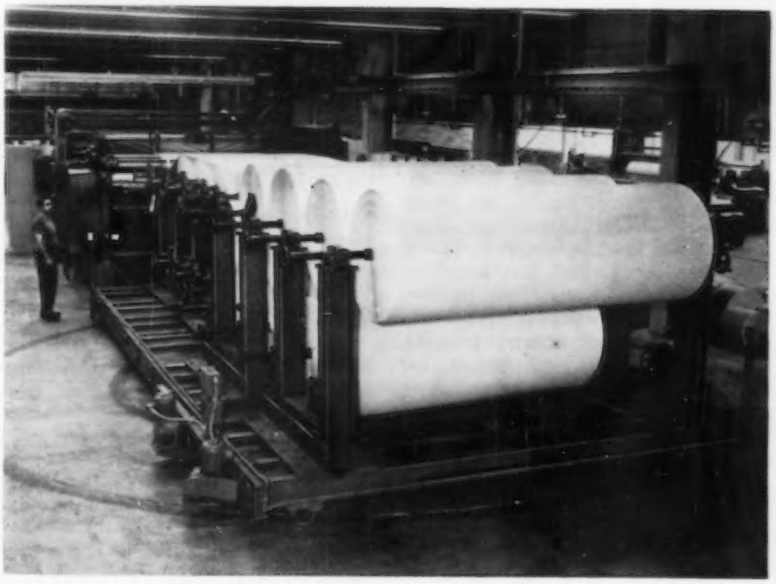


Figure 2—Revolving back stand developed for quick changing of roll sets increases production, reduces downtime.

run required one boss cutter-man, one helper and one girl at the layboy; complete running time, with loading and unloading was six hours and spoilage was five per cent. The estimated daily saving in labor, running time and spoilage was $463.00.

In another New York state mill, elimination of slitting on the sheeter resulted in reducing spoilage from 30 to eight percent, down time from 28 to 10 percent, and increased production 40 percent. Also there was a reduction in personnel from 90 people to 50. This saving in labor and spoilage exceeded $480,000 per year. All this was accomplished by the addition of only $6,000 of accessory equipment and following our suggestions as outlined above.

Trimming

Beyond the sheet cutting operation is the guillotine trimmer department. With automatic spacers, air tables and lift tables, the trimmer operation has been holding its own in the speed up picture. One such 95 inch trimmer with one operator and eight paper handlers can cut twice as much paper as three 60 inch trimmers with three operators and six paper handlers. The opposite is true in trimming as opposed to slitting, namely the wider the equipment the better. Wider guillotines permit front and rear feeding and handling of the trimmed sheets.

Continuous feeding of paper lifts means greater production. The operator is constantly cutting, sizes are set automatically and accurately, back gages move paper into position for cutting and move away to accept further lifts. Hydraulic or electric platforms keep skids in position to unload onto or receive paper from the trimmer table. Ream sealing has become completely automatic and the modern ream sealer can outperform 30 manual sealers. Carton sealing and skid strapping equipment has been developed that makes these operations semi-automatic. Hoists and lift trucks of countless descriptions handle paper in all forms and transport paper to and from all mill operations effortlessly and efficiently.

In Conclusion

The introduction of methods to increase efficiency and reduce waste will remove the finishing room operation from the status of "stepchild" and management will allot the finishing room its proper place in the overall mill operation. Most finishing rooms are working in cramped quarters and room for accessory equipment is not available. However, management must realize that the finishing room can be the key to a profitable mill operation and allot space and funds for its proper development.

Practical Application of Statistics to Pulp Washing

W. B. Simmons

Technical Director
St. Joe Paper Co.

Some time ago we, at St. Joe Paper Co., ran into a problem which should be of interest. We had just recently installed a new type of pulp washer, Impco Valveless Washers, and found that at times we were operating at design capacity; while at other times, we could not get over 25 per cent of capacity.

I began to ask questions as to why the difference in operation. After talking to a number of people, and getting as many different answers as people I talked to, a test program was initiated.

As one of our staff had just completed a course in statistical analysis, we felt that here was an opportunity to use this training. Broadly speaking, statistical methods may be of use wherever conclusions can be drawn, or decisions made on the basis of experimental evidence. As in any experiment, you must be able to measure the end result; in our case, through-put of the washers, and be able to measure and control the factors which affect this end result.

Stock System and Controls

At this point I would like to give a description of the set-up in this part of the mill. At St. Joe Paper Co., we refine the stock with Sutherland refiners prior to washing. The refiners are used to break up the knots, chips, and fiber bundles in order to decrease the screen rejects and improve the removal of residual liquors.

The following is a step by step description of this process, together with the control system we use:

1—Our first control is in the digester room. Here by varying cooking conditions we can vary and control the chlorine number. The chlorine number is measured at regular intervals.

2—After the cook is blown, the consistency of the stock in the blow tank is automatically measured and controlled by means of the motor load on the agitator in the blow tank.

3—From the blow tank the stock is pumped to the Sutherland refiners, and the inlet pressure to the refiners is automatically measured and controlled by bypassing part of the stock back to the blow tank.

4—Sutherland refiners are disk type refiners, and the amount of work done on the stock can be varied and controlled by changing the distance between the disks. The amount of refining is measured by the ampere reading on the refiner drive motor. From experience, we know that over-refining decreases wash room production, and under-refining decreases screen room production. So, we have a narrow range within which we have satisfactory operation in both the wash room and the screen room.

5—There are numerous other factors which effect through-put on the washers which can be measured, but cannot readily be controlled. This includes refiner disk age, age of the wood being cooked, amount of entrained air, etc.

Laboratory Testing

We might add at this point, that we have a complete test station located in the wash room where the following tests are made on a routine basis:

1—Roe chlorine number
2—Drainage rate
3—Per cent rejects

4—Alkalinity
5—Consistency

Due to being located in the wash room, the test results are immediately available.

In addition to the routine tests, the main laboratory can make special tests and has a flame photometer where we can determine soda losses in a matter of minutes, instead of hours as previously needed.

With the above set up, we were confident that we could get reliable measurements without undue delay.

Selection of Approach to Problem

To return to our problem, our statistician informed us that there were several methods of attacking this problem. One, the analysis of variance where the factors influencing the final measurement can be controlled at a fixed level, is the one favored by the statisticians.

However, in our case, due to numerous factors, it was more attractive for us to forego this type of experiment and infer the relationship of the fluctuations during normal plant operation. Under our circumstances it was believed that the multiple correlation method would enable us to determine the effect of the various factors and their relative importance, or rank.

As multiple correlation is very complex mathematically and statistically, I will not attempt to explain it. However, there are numerous books on statistics which give complete details.

Variables Affecting Washing

To use statistical language, we had a dependent variable, washer throughput, which was affected by several independent variables. They were:

1—Chlorine number
2—Consistency of the stock
3—Refiner inlet pressure
4—Refiner motor loading
5—Unexplained variation

Multiple Correlation Analysis of Data

We gathered data on their day by day fluctuations, and after spending a couple of days calculating, we came up with the following relative order of importance, or rank for the various variables:

Per cent consistency	.489
Chlorine number	.138
Refiner motor loading	.121
Refiner inlet pressure	.011

Improved Consistency Control

This indicated that we should concentrate our efforts on consistency control, which was contrary to previous reports. In cooperation with the meter department, we went to work and made improvements in the consistency control.

This smoothed out operations and after several days we ran another series of tests, and as was to be expected, came up with a different order of magnitude, as consistency control had been measurably improved.

The new order was:

Refiner motor loading	.340
Chlorine number	.246
Per cent consistency	.151
Inlet pressure	.014

Summary

As long as we maintained this relative order of magnitude, our operations were satisfactory. However, on several occasions when troubles were encountered, we have been able to pinpoint our trouble by the use of multiple correlation techniques. Usually on analyzing our data we find that a new order of relative magnitude had evolved in operations, and when this was corrected, operations were again smoothed out.

While the use of statistical techniques is subject to much criticism due to lack of understanding, it is our belief that the proper use of statistical methods, supplemented by, or as a supplement to, personal judgment will insure the maximum use of information obtained in experimental or day by day routine data.

However, the final application of statistical methods is their performance in practice, which in our case has been very satisfactory.

Trick Truck

Variation in loading dock height now poses no problem to W. H. Atkinson, Montgomery, Ala., distributor for Nekoosa Edwards Paper Co. Reason: A new custom-built truck can elevate the load to any level between 39 inches and 5 feet. Lift is provided by a hydraulic cylinder operated from a power take-off as in a dump truck.

Here's how the trick truck came into being: Many of the loading docks in Montgomery were built for horse-drawn drays; others were built for trucks in the 20's. Some for modern transports are as high as 60 inches. Since loads are palletized, the variation meant extra work.

In an attempt to avoid this rehandling of merchandise, Mr. Atkinson discussed the problem with Don Greene, warehouse foreman, who came up with the solution in the form of a 9-inch long wooden model of the trick elevator truck. The idea was taken from there, a 9-foot long scale model was constructed, and finally culminated in the construction of the full-size custom-built truck.

Although there are a couple of firms in the U. S. that make a similar vehicle, their design requires a 12-foot body and does not telescope enough to be used with some of the extremely low docks found in Montgomery.

Don't Stand There; Do Something!

That's Hudson Pulp and Paper Company's positive approach to the recession.

Contrary to companies who have met our industry's current over-capacity problem with cutbacks and layoffs, Hudson Pulp & Paper Co. has launched an aggressive plan, called "Operation Capacity," designed to maintain full capacity and full employment in the firm's five plant communities. Intended to boost the morale of its 4,000 employees, the program aims to increase sales volume, lower operational cost, and provide the basis for further expansion, in spite of the weak economy and price-cost squeeze.

The company's goal is a minimum five per cent reduction in manufacturing costs (now two-third's of every sales dollar) through elimination of waste, improved operating techniques and reduction of make-work activities. This will enable Hudson to add 50 more salesmen to its consumer, industrial and multiwall divisions; increase overall advertising 50 per cent (total budget is now over $1,500,000) and expand distribution into new markets.

Fourteen Point Program

The fourteen projects which make up "Operation Capacity" are:—strengthening the organization structure; expanding the sales force; re-emphasized sales (customer) service; improved company-employee communications; increased supervisory training; expanded sales aid programs for distributors; reduction of unnecessary paper work; elimination of waste and unnecessary work; installation of standard cost system and a reduction in product costs; improved quality through self-inspection and careful attention to standards, organization of a plant employee suggestion system; inventory reduction; development of standards of performance individual performance appraisal, and employee support for Hudson consumer products.

The initiation of "Operation Capacity" began in early March, when a management team toured all company plants, met with employees, suppliers and community leaders to outline the cooperation needed to keep Hudson plants running.

To dramatize the importance of the program, several promotional campaigns were undertaken. A cartoon character has been developed to represent the employee spirit behind "Operation Capacity." Hudson's cartoon device is called "Ossie" (short for "O.C."—"Operation Capacity"). He appears on signs, progress charts, posters and display material set up in all plants and in local community traffic areas.

"Ossie" is the hero in a slide film presentation shown to employee groups by immediate supervisors in all Hudson plants. The presentation explains how they can specifically make "Operation Capacity" a success.

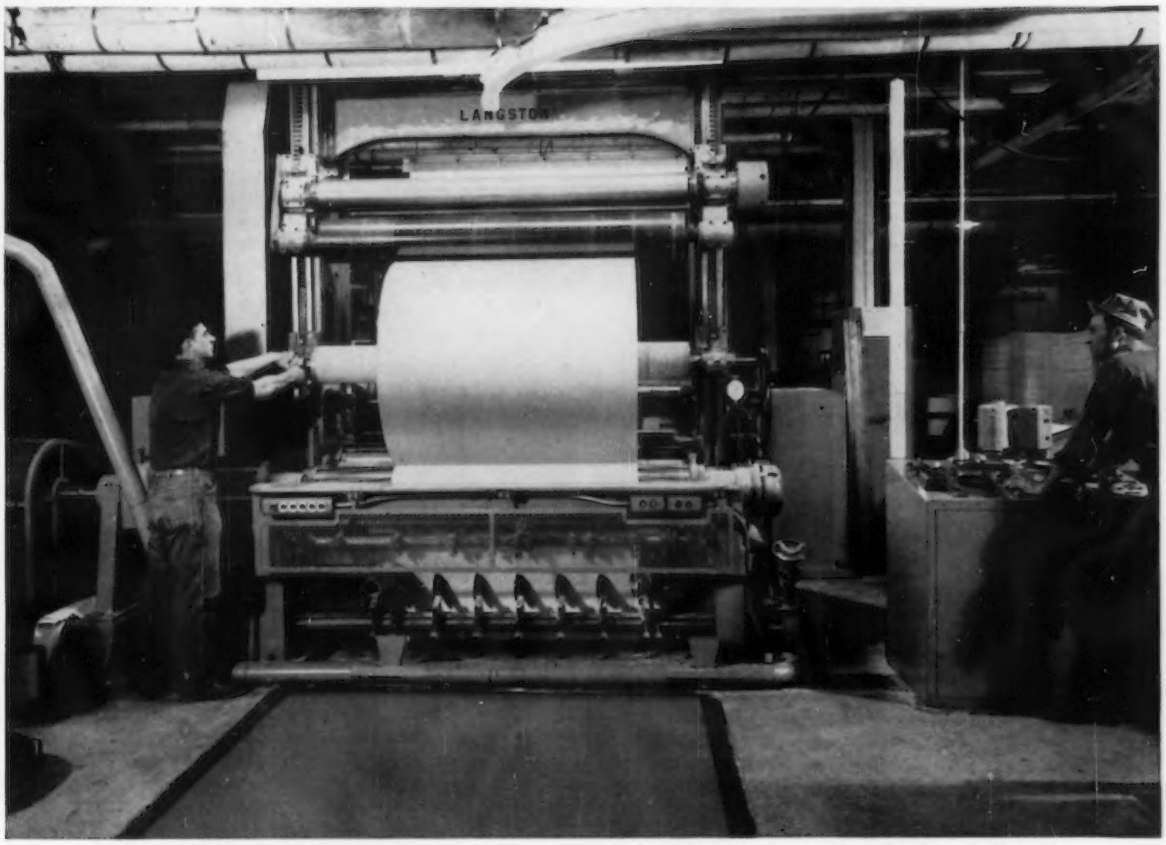
Punch Line Is Close to Home

By slides, employees were told that Hudson was operating at normal levels while the industry was at five-sixths of capacity. If Hudson fell to the industry level, it was pointed out, employees would lose $52.50 per month in wages and many people would be laid off. "Just think," the slide talk continued, "if we can bring our manufacturing efficiency into line with these other companies by reducing costs only five per cent—that's just 3½ cents less than it is now—we would be able to assure increased volume and maintain full capacity because the 3½-cent saving would let us sell more products. Hudson, like any other company, can sell more of its output by opening up new markets, getting more salesmen out selling the product, more advertising and promotion. Here's where Ossie can really help because the 3½-cent saving would let us add 50 salesmen to expand our sales effort for kraft, multiwall and tissue products . . . increase our advertising and sales promotion 50 per cent . . . and we could afford the freight to send our merchandise an additional 200 miles . . ."

Other promotional effort behind the "Operation Capacity" program includes contests and incentive programs for which employees and their families are eligible. These programs are prepared by a committee of company executives and are implemented by the plant managers as needed.

Advertising is also used to communicate the meaning of "Operation Capacity." Local newspapers are carrying schedules of small space "Ossie Says" ads once a week and Hudson is sponsoring five-minute local club news programs in some of its plant communities.

Hudson's cost for the entire "Operation Capacity" program is roughly $10,000 to date. The results have been good; volume has increased and inventories have decreased; local papers have devoted a great deal of space and many favorable editorials to the program.



New 72-inch Type CA Langston Slitter and Winder in Marathon Corporation finishing room handles rolls up to 60 in. in diameter at speeds up to 1500 ft. per minute. Finished rolls are lowered by hydraulic drop shown in foreground.

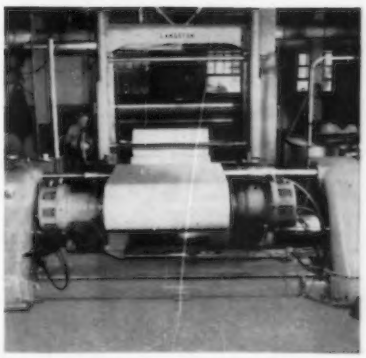
New Langston Slitter and Winder helps Marathon cut operating costs

This new Langston Slitter and Winder installation at Marathon Corporation's Rothschild, Wis., mill is already helping the company cut costs and speed processing of quality paper and board.

For example, the power-operated shaftless unwind stand virtually loads itself. No crew is needed to bull heavy shafts into place. And the Langston hydraulic roll ejector permits 1-man removal of finished rolls. These two features alone are saving Marathon several thousand dollars a year. Water-cooled Wichita-type air brakes can be operated from control console.

Besides effecting major operating economies, these Langston machines also pay off in higher quality rolls. The hydraulic rider roll control, for instance, automatically keeps nip pressure constant, regardless of the diameter or weight of the rewound roll. This insures rolls of uniform density with reduced tendency toward wrinkling or telescoping. The shear-cut slitters cut like scissors instead of a knife, shearing cleanly and keeping paper dust to a minimum. The resulting clean-edged, dustfree rolls are easier for customers to process.

Learn how you can benefit from the advantages of Langston Slitters & Winders. Write SAMUEL M. LANGSTON CO., 6th & Jefferson Sts., Camden 4, N.J.



Langston Shaftless Unwind Stand eliminates the time-consuming, back-breaking task of hoisting heavy shafts into place. The hydraulically actuated arms reach out, pick up the roll and lift it to running position—a 1-man, push-button operation.

SHEAR CUT CLEAN CUT

LANGSTON *Leadership...by design*

NEW LITERATURE

Corrosion Resistant Plastic Equipment

Describes the selection of the proper plastic for each and every chemical corrosion problem. Also covers concisely with tables, pictures, diagrams and descriptions such fields as physical properties, chemical resistance and typical equipment applications. Bulletin C-15. Haveg Industries, Inc., 900 Greenbank Rd., Wilmington 8, Delaware.

This is Fischer & Porter Co.

Describes facilities and diversified products such as flowmeter, process instrumentation, data reduction and automation equipment, chlorination equipment and glass products. Also outlines growth of company and discusses future plans. Fischer & Porter Co., 792 Jacksonville Rd., Hatboro, Pa.

Fairbanks Bronze and Iron Body Check Valves

Includes 40 photographs and cutaway illustrations of their complete line of bronze and iron body check valves. Brochure V-63. Fairbanks Co., 393 Lafayette St., New York 3, N. Y.

Hodag Additive for Pulp and Paper Mills

Provides data on applications for WR-301 which is a flaked product. Also tells how to use, how much to use, and packaging information. Information Sheet. Hodag Chemical Corp., 7247 N. Central Park, Chicago 45, Ill.

Some Fundamental Research Problems of the Pulp and Paper Industry. Prepared by the Committee on Coordination of Research of the American Paper and Pulp Assn., the 14-page booklet states in six basic fields various fundamental research problems of the pulp and paper industry.

In general, broad problems are presented, and they are followed by more specific subjects, many of which are well suited for investigation by the undergraduate and graduate student. Copies are available from the American Paper and Pulp Assn., 122 East 42nd St., New York 17, N. Y.

B. F. Goodrich Protective Clothing

Illustrates and describes work suits, raincoats, storm suits, gloves and aprons used in industry. Charts make it easy to select garments according to weight, service, color and material. A special section is devoted to glove selection. Catalog. B. F. Goodrich Industrial Products Co., Akron, Ohio.

Hot Melt Applicator Model CW Thermogrip

Utilizes a heated applying wheel to deposit a desired pattern on any material or object requiring an adhesive. Paper, foil, polyethylene coatings and cloth are some of the materials currently being bonded. Bulletin. United Shoe Machinery Corp., Boston 7, Mass.

Link-Belt Ball Bearing Trolleys

Describes how these trolleys work in maintaining the efficiency of trolley conveyors. Also contains 20 pages of specific data on types and sizes available. Book 2636. Link-Belt Co., Dept PR, Prudential Plaza, Chicago 1, Ill.

Jerguson Boiler Water Gages and Valves

Covers in detail their line of high pressure boiler water gages, including gages with offset single piece gage chamber design that eliminate blind spots to give more inches of visibility. Also includes illustrations and specifications. Jerguson Gage & Valve Co., 80 Adams St., Burlington, Mass.

Palletless Handling in Manufacturing Plant

Presents a case history illustrated with action photos taken right in the plant. Also gives a pictorial explanation of how this principle was applied to moving and storing cartons of dishwashers. Bulletin 362-1. Lewis-Shepard Products, Inc. Dept. R8-15, 125 Walnut St., Watertown 72, Mass.

Plasite—Corrosion Resistant Coatings

Tells how No. 7122 may be used for protection of steel tanks, wet end of paper machines, fume hoods and ducts, grating and in high humidity conditions. Technical Bulletin 258. Protective Coating Co., P. O. Box 243, Green Bay, Wis.

R-C Cyclodal Blowers for Vacuum Service

Includes full information on construction, and technical data on capacities and ratings, many of which have been recently increased. Also provides a full-color cutaway view which shows the design features of this blower. Bulletin VP-158. Roots-Connersville Blower, 900 West Mount St., Connersville, Ind.

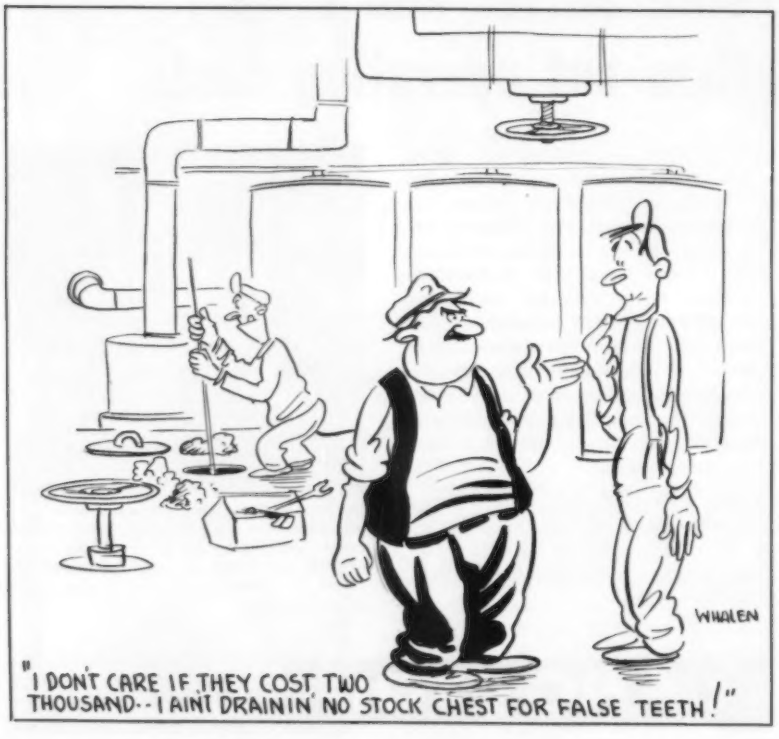
Selection Guide to Silicone Insulating Components

Describes and illustrates a step by step procedure for winding electric motors. Also lists all insulating components for random and form wound rotos and stators, as well as dry type transformers. Brochure 10-109. Dow Corning Corp., Midland, Mich.

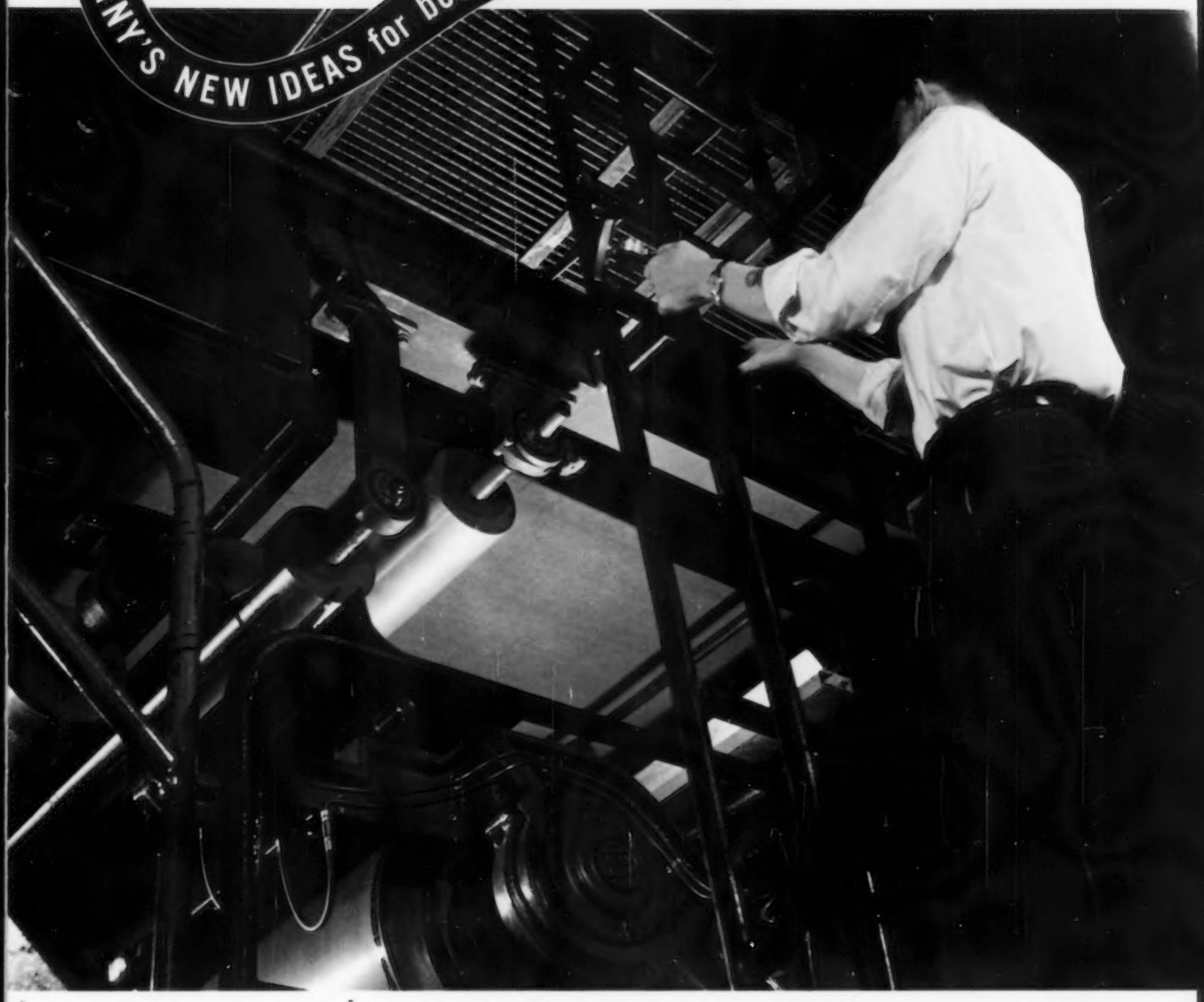
Silco-Flex Impervious Insulation System

The basis of this system is a semi-

(Continued on page 48)



ALBANY'S NEW IDEAS for better papermaking



Albany Service Engineer checks felt installation during startup of The Ruberoid Co.'s new 150" trim roofing felt machine at Gloucester City, N.J.

HOW SERVICE ENGINEERING WORKS

The Albany Felt Service Engineer represents the ultimate in felt operation know-how. Unlike the Sales Engineer, who makes regular calls on your mill to take care of normal requirements, the Albany Service Engineer is the industry's top trouble shooter, always on call for emergencies. From consultation on machine design, through new machine startups and analysis of difficult felt operation problems, your Albany Service Engineer's years of specialized training and machine experience are available to help you operate more efficiently and economically.

His diagnosis of your felt requirements, translated to Albany's outstanding research-design-manufacturing team, inevitably results in better felts for your machine. Our Service Engineers are available whenever needed—their goal, as always, to help you produce more saleable tons per day!

AF

ALBANY FELT COMPANY

MAIN OFFICE & PLANT, ALBANY, N.Y.

OTHER PLANTS: HOOSICK FALLS, N.Y.; N. MONMOUTH, ME.; ST. STEPHEN, S.C.; COWANSVILLE, P.Q.

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West End **SALT CAKE** merits your confidence for its consistent purity

Here is the new high standard of salt cake quality achieved by exclusive West End production techniques and controls. The product is pure white and exceedingly low in heavy metal content. It is guaranteed 99½% minimum Na_2SO_4 yet actually runs 99.75% to 99.8% Na_2SO_4 typically. We invite your attention to the adjacent typical analysis and welcome your communication.

TYPICAL ANALYSIS

Na_2SO_4	99.5% or better
Na_2O	.05% max.
B_2O_3	.05% max.
NaCl	.07% max.
Insoluble	Trace
Loss on ignition	Less than 0.1%
Solution	Clear
Color	White

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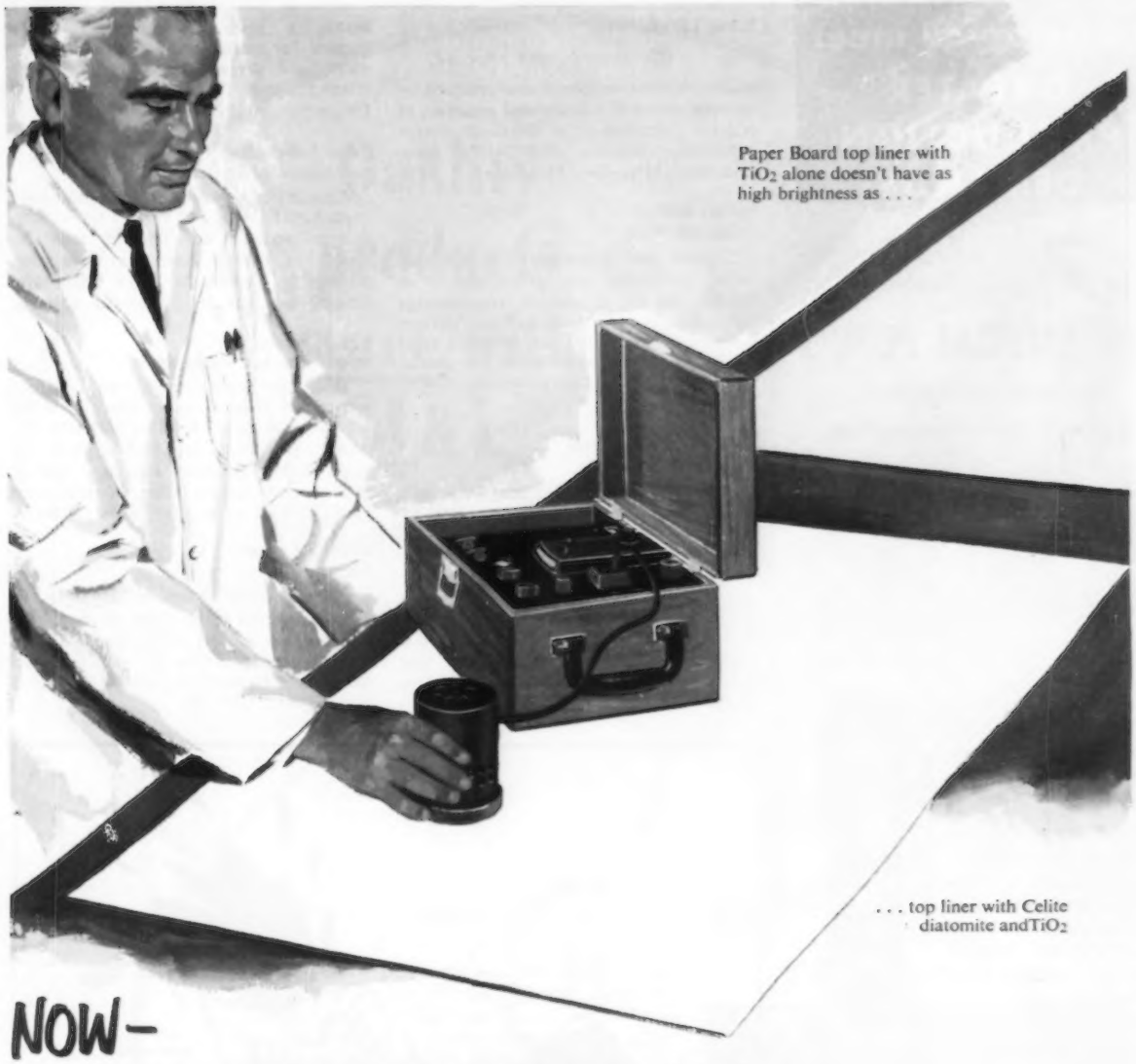
DIVISION OF STAUFFER CHEMICAL COMPANY

EXECUTIVE OFFICES, 1956 WEBSTER, OAKLAND 12, CALIF. • PLANT, WESTEND, CALIF.

SODA ASH • BORAX • SODIUM SULFATE • SALT CAKE • HYDRATED LIME



NOW—

Keep top liner brightness high . . . cut production costs, too

Use Celite diatomite with 92% brightness

Some grades of low-cost Celite* have an unusually high brightness. Their Tappi rating is 92%. Even when used alone, Celite will increase furnish brightness.

To increase top liner opacity and reduce production costs, you can replace part of the Titanium Dioxide with intrinsically bright, low-cost Celite.

What's more—because of Celite's unique physical characteristics, more TiO_2 is retained in the sheet when the two are used together. This TiO_2 retention results in better dry opacity and lower costs than if TiO_2 is used alone.

The unique structure of individual Celite particles produces a porous, fluffy powder that scatters light and imparts opacity. Celite has a very low loose weight density and good suspension characteristics—improves formation, drainage and drying.

You can prove the many advantages of Celite to yourself in your own mill, quickly and easily. Call in your nearby J-M Celite Engineer for a free consultation and complete information. If you wish, he'll assist in making trial runs—at no cost or obligation. Write Johns-Manville, Box 14, New York 16, N. Y. In Canada, Port Credit, Ontario.

*Celite is Johns-Manville's registered trade mark for its diatomaceous silica products

(Photovolt Reflection Meter courtesy of Testing Machines, Inc.)

Celite has many paper production advantages:

Controls Pitch
Increases Opacity
Reduces Pigment Costs
Speeds Board Production

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JM PRODUCTS

To help you meet GREATER PRODUCTION DEMANDS

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CENTRIFUGAL PUMPS

***Provide* Continuous, Trouble-free Operation**

Horizontal "TS" Pump

For 40 years, Frederick Pumps have been helping paper mill operators meet ever increasing production demands by giving efficient, economical service with a minimum of maintenance and production down time. There is a complete line of mechanically advanced Frederick pumps for all purposes — each custom engineered and guaranteed to meet the operating conditions for which it is sold.

Vertical "TS" Pump

If you are planning to build a new plant or enlarge your present one, take advantage of the wide experience of Frederick pump engineers—who have helped to solve pump problems for some of the largest mills in the industry. Write or phone today for complete information and illustrated literature.

FREDERICK PUMPS

"The efficient, dependable heart of paper mills for 40 years"

FREDERICK IRON AND STEEL, INC.
FREDERICK *Est. 1890* MARYLAND

New Literature

(Continued from page 44)

organic silicone elastomer characterized by extreme chemical stability and retention of original properties under the most adverse conditions. Bulletin 05B8341A, Allis-Chalmers, Mfg. Co., Milwaukee 1, Wis.

Specify Sylkyd Enameled Wire

Reports that laboratory tests on wire twists, motorettes, etc. prove that it is suitable for use in motors, transformers and other electrical and electronic devices designed for operation at Class H temperatures. Also includes tables and charts. Brochure 10-404. Dow Corning Corp., Midland, Mich.

Seamless Carbon Steel Mechancial Tubing

Explains how production can be simplified by selection of the proper type of mechanical tube. Technical Folder TB-418. Tubular Products Div., Babcock & Wilcox Co., Beaver Falls, Pa.

Tells Story of Alloy Fabrication

Includes over 80 photographs and sketches, as well as detailed descriptions of products and fabricating techniques makes a permanent handy reference manual for management; design, development, and process engineers; and purchasing agents. S. Blickman, Inc., 8400 Gregory Ave., Weehawken, N. J.

Trico Lubricating and Electrical Devices

Contains eight pages of descriptive data explaining the usage of various types. Also features products developed to assist industry in cutting costs and increasing production. Catalog 58. Trico Fuse Mfg. Co., 2948 N. 5th St., Milwaukee 12, Wis.

Ten Ways to Regenerate Ion Exchangers

Tells how each of the ten methods works and what controls and equipment are required in each case. Methods discussed, run from the earliest types to more modern practices and each method is illustrated. Graver Water Conditioning Co., 216 W. 14th St., New York 11, N. Y.

Vibrating Paper Joggers

Contains complete descriptions, data and specifications of three styles of joggers in ten standard models with vibrating table sizes ranging from 7 by 10 inches to 28 by 40 inches. Syntron Co., 587 Lexington Ave., Homer City, Pa.

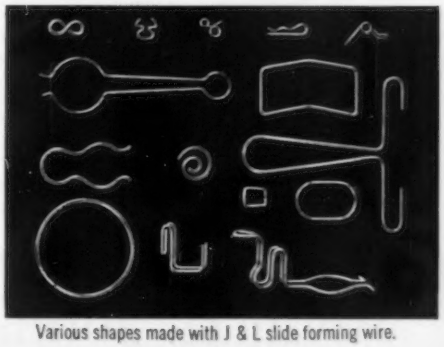
Quality products start with J&L stainless steel wire

Long-lasting filters and screens are woven from stainless steel wire.

Many types of screws are more economically formed by cold heading.

Many types of products are fabricated from stainless steel wire. We suggest you consider Jones & Laughlin Stainless Steel Wire where ease of forming or special corrosion or heat resisting properties are required.

For *your* particular application or production problem, we offer the services of our stainless steel specialists. A letter or call will receive prompt attention.



Various shapes made with J & L slide forming wire.

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BAR • WIRE • SHEET • STRIP

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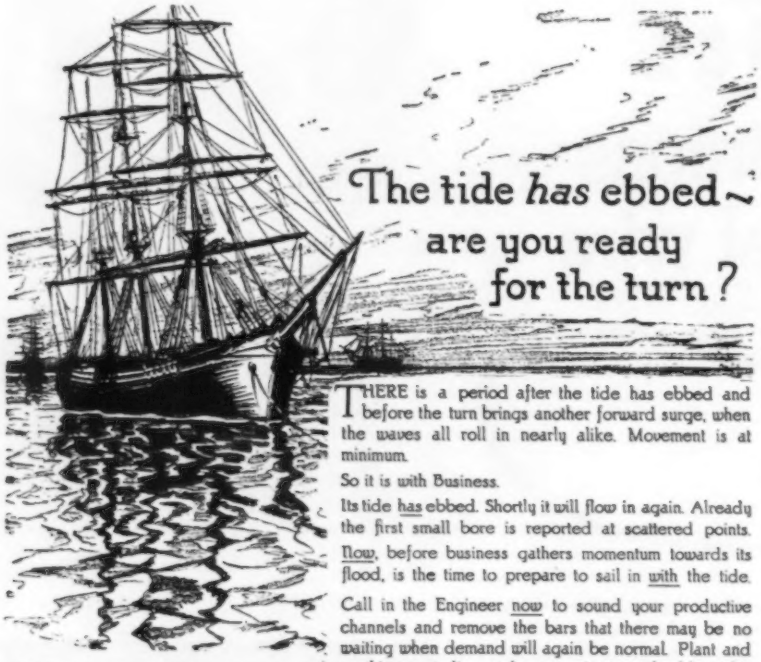
OBITUARIES

William P. Brockermann Jr., 74, vice president of Wolf Brothers, Philadelphia manufacturers of paper products, died June 27.

Thomas A. Francis, 88, paper mill superintendent for Crocker, Burbank & Co., in Fitchburg, Mass. for 38 years, died July 2. A native of England, he lived in Fitchburg 65 years. He was employed by the paper firm for 63 years.

Reynolds R. Perry, 51, a vice president of Harris-Seybold division of Harris-Intertype Corp., died suddenly in his sleep June 30 at his home in Cleveland, Ohio.



The tide *has* ebbed ~ are you ready for the turn?

THERE is a period after the tide has ebbed and before the turn brings another forward surge, when the waves all roll in nearly alike. Movement is at minimum.

So it is with Business.

Its tide has ebbed. Shortly it will flow in again. Already the first small bore is reported at scattered points. Flow, before business gathers momentum towards its flood, is the time to prepare to sail in with the tide.

Call in the Engineer now to sound your productive channels and remove the bars that there may be no waiting when demand will again be normal. Plant and machinery studies and reorganizations should not be delayed. Plans should be made for possible needed additions.

The tide has ebbed.

THIS AD IS JUST AS PERTINENT TODAY AS WHEN IT FIRST APPEARED A QUARTER CENTURY AGO—FOR NOW AS THEN THE TIDE HAS EBBED . . . ARE YOU READY FOR THE TURN?

J. E. SIRRINE COMPANY · **Greenville, South Carolina**

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A DEPARTMENTALIZED ENGINEERING ORGANIZATION SERVING • BUSINESS • COMMERCE • INDUSTRY

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STRUCTURAL AND ARCHITECTURAL DESIGN

REPORTS APPRAISALS ESTIMATES AND SURVEYS

PRICES OF MATERIALS

Aluminum sulphate:			
coml. bulk, c.l. wks.	cwt.	$2.00	/ —
iron-free, c.l. wks.	cwt.	3.55	/ —
Casein, acid prec.:			
dom. sh. pt. c.l. (30 mesh)	cwt.	56.00	/
Arg. ex dock	cwt.	18.75	/19.25
New Zealand	cwt.	23.50	/24.00
Caustic soda:			
c.l. wks. solid, 76%	cwt.	4.80	/ —
flak. & grd. drums, c.l.	cwt.	5.20	/ —
liquid 50% tanks		2.90	/ —
liquid 73% tanks		3.00	/ —
China Clay			
dom., dry-grd., airfloat:			
325 mesh bgs., c.l. Geo.	ton	10.00	/12.00
300 mesh, bgs., c.l. Geo.	ton	13.50	/14.50
imp., white, lump, c.l. ex. dock		20.00	/35.00
Chlorine:			
single-unit tanks, works	cwt.	3.15	/ —
multiple unit, 2-5 cars per yr.		5.75	/ 4.05
Lime:			
hydrated, bulk, c.l. N.Y.	ton	23.55	/ —
quicklime, bulk, c.l. N.Y.	ton	20.55	/ —
Gum rosin:			
K, M, N, drums, c.l. Savan,	cwt.	7.75	/ 7.85
Rosin size:			
70%, gum & pale paste, tank cars, south, sh. pt.	cwt.	7.51	/ —
Saltcake:			
dom. bulk, 100% anh. wks.	ton	28.00	/ —
Soda ash:			
light, 58% ash bags, wks.	cwt.	1.85	/ —
bulk, c.l. wks.	cwt.	1.55	/ —
Sodium chlorate:			
drums, c.l., wks.	cwt.	9.00	/ —
drums, l.c.l., wks.	cwt.	9.50	/10.50
Sodium peroxide:			
dms., c.l. E. of Miss.	lb.	.20½	/ —
l.c.l. (same basis)		.21	/ .21½
Sodium silicate, 40° Be.:			
tank-cars, wks.	cwt.	1.20	/ —
drums, c.l. wks.	cwt.	1.55	/ —
47° Be. WW.			
tank-cars, c.l. wks.	cwt.	1.90	/ —
drums, c.l. wks.	cwt.	2.25	/ —
Soybean, protein:			
chem. isol., wks. c.l. bags	lb.	.19	/ .23
Starches:			
Corn, multiwalls, c.l. prod. plant:			
pearl	cwt.	6.49	/ 6.75
white, dextrins	cwt.	8.08	/ 8.20
chlorinated	cwt.	8.25	/ 8.35
potato, Idaho, c.l. wks.	cwt.	6.35	/ —
East, fr. all. 50 cents cwt.			
potato, Maine, f.o.b. wks.	cwt.	6.25	/ —
Sulphuric acid:			
60° Be. cbys. c.l. wks.	cwt.	2.00	/ —
l.c.l. wks.	cwt.	2.30	/ —
tank-cars, wks.	ton	18.60	/ —
Sulphur:			
crude, c.l. mines, contract,	long ton	23.50	/ —
f.o.b. vessels Gulf dock	ton	25.00	/ —
Sulphur dioxide:			
liquid, coml. cyl., wks.	lb.	.10	/ .12
multi-unit cars, wks.	lb.	.0535	/ —
Talc, fibrous grd., bags:			
c.l. wks., N.Y.	ton	28.00	/ —
l.c.l. wks., N.Y.	ton	31.00	/36.00
Titanium dioxide:			
anatase, c.l. dlvd. E. bags	lb.	.25½	/ —
l.c.l. dlvd.	lb.	.26½	/ —
rutile, c.l. dlvd.	lb.	.27½	/ —
l.c.l. dlvd.	lb.	.28½	/ —

NEWS OF MERCHANTS

Ingram Expanding L. A. Warehouse

Ingram Paper Co., Los Angeles, paper distributor now marking its 35th year, has announced plans for a 50 per cent expansion of its warehouse.

Estimated cost of the addition is $300,000. It will add 45,000 sq. ft. of floor space to the present 90,000 sq. ft. of Ingram's completely mechanized one-story warehouse. When the present structure was built, movable walls were erected on two sides to allow for the expansion.

Paper Corp. of U. S. Adds to Sales Staff

Paper Corp. of United States, 630 Fifth Avenue, New York 20, N. Y., announces additions to its sales forces, as follows:

William R. Murray recently joined the company's Book Manufacturers Division, and under the direction of Mellen P. Cushman, vice president, is specializing in the sales of text papers, bible papers, offsets, etc., as well as end leaf and book-covering papers, including the Joanna Western Mills' line of book cloths and linmaster, an imported book—covering material.

Robert Gefaell, formerly with Pulpaper, has become a member of the sales staff, selling all types of papers to printers, lithographers, converters and industrials.

Abidam Archilla, executive vice president of the corporation's wholly owned Latin American subsidiary, Paper Corp. of Latin America, also announces that Ramon Orlando Martinez has joined its sales force, and is operating out of the main office located in San Juan, Puerto Rico.

Jacksonville Paper Names Officers

Jacksonville Paper Co., Jacksonville, Fla., has announced the appointment of Fred Martin as vice president, heading the new staff function of operations in the six Southeastern states covered by the company's 19 branches.

Another appointment was that of John Fox as assistant vice president of the fine paper division. Mr. Fox has been branch manager of the fine paper division at Jacksonville. Jeff Thompson, also of Jacksonville, is taking over Mr. Fox's former position.

IF YOU USE

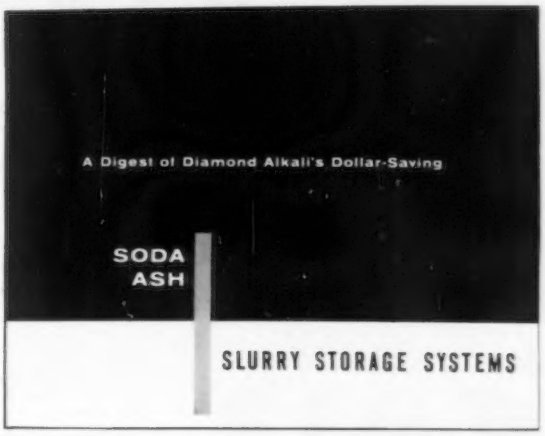
SODA ASH

as a solution in processing operations

Here's how you can:

cut storage space by 60%
eliminate dust
simplify and speed up handling
step up efficiency, save money

Get this FREE booklet from Diamond



This 16-page book is loaded with facts, photos, and full-page diagrams showing the three alternate Diamond-developed slurry storage systems now used in many plants. The book is yours, FREE. Mail the coupon today.

For complete information or informed technical service, call your Diamond Representative or write Diamond Alkali Company, 300 Union Commerce Bldg., Cleveland 14, Ohio.

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Please send me the free book, "Soda Ash Slurry Storage Systems".

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TITLE _____

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ALSO SEND ME INFORMATION ABOUT DIAMOND

CHLORINE ☐ CAUSTIC SODA ☐ SILICATE OF SODA ☐ SALT CAKE ☐

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ammonia
chlorine
soda ash
sulfuric acid

CAUSTIC SODA

nitric acid
carbon dioxide
sodium nitrate
methanol

NOW?

Tank cars, tank trucks, barges, and tankers—seven shipping points when you...

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OLIN MATHIESON CHEMICAL CORPORATION
INDUSTRIAL CHEMICALS BALTIMORE 3, MD.

PRICES OF FIBERS

MARKET WOOD PULP

THIRD QUARTER CONTRACT PRICES PER SHORT AIR-DRY TON

Delivered Basis

	U.S.	Canadian	Swedish	Finnish	Norwegian
Groundwood	$82.50/ 90.00	$82.50/ 90.00	‡$90.00/ —	‡$90.00/ —	‡$90.00/ —
Bleached Gw'd.	$97.50/100.00	$97.50/100.00			
Kraft, Blchd.	157.00/ —	160.00/162.50	$157.00/162.50*		$157.50/ —
Kraft, Blchd. Hdwd.	152.00/ —		$137.00/ —		
Kraft, Semi-bleached	140.00/ —	140.00/ —			
Kraft, Unbl.	117.50/125.00	125.00/130.00	†125.00/130.00	125.00/ —	
Sulphite, Blchd.	155.00/ —	155.00/ —	*155.00/ —	*155.00/ —	155.00/ —
Sulphite Bl. Hdwd.	150.00/ —				
Sulphite, Unblchd.	135.00/ —	135.00/ —	†135.00/ —	*130.00/ —	
Sulphite, Unb'l. Gl'sn		134.00/ —	†134.00/ —		
Soda, Blchd.	147.00/150.00	150.00/ —			

‡ On Dock Atlantic Ports. * Freight allowed. † Varying Freight Allowances

NEW YORK RAG MARKET

PRICES NOMINAL

New Domestic Cotton Cuttings

Delivered Mill Basis

	Per 100 lbs.
No. 1 White Shirts	$13.50/$14.50
No. 1 Unblchd. Muslins	16.00/ 17.00
Blchd. & Unblchd. Underwears	15.00/ 16.00
No. 1 Light Cream Silesias	12.00/ 13.00
No. 1 Light Blue Overalls	7.00/ 8.00
Percales	6.00/ 6.50
No. 1 Light Prints	5.00/ 5.50
Suntan Khakis	5.75/ 6.75
Cottonades	3.00/ 3.50
No. 1 Washables	2.50/ 3.25

Old Domestic Cotton Rags

Delivered Mill Basis

	Per 100 lbs.
Mixed White	$3.25/$3.75
Cotton Pants & Overalls	2.25/ 2.75
Twos and Blues, Repacked	2.00/ 2.50
No. 2 Roofing	.60/ .75

COTTON LINTERS

Memphis Market

f.o.b. Oilmills

Week Ended July 11	Per 100 lbs.
Grade 1	n. a.
2	
3	$9.50/ $8.00
4	7.50/ 7.00
5 — 1 cut—felting	6.50/ 6.00
6	5.50/ 5.00
7	5.00/ 4.50

*Based on 73% cellulose.

OLD ROPE & BAGGING

(Prices to Dealers, f.o.b. N.Y.)

	Per 100 lbs.
New Burlap Cuts	$4.50/$5.50
Scrap Burlap	3.50/ 4.25
Australian Wool Pouches	5.00/ 5.50
Gunny	4.50/ 5.00
No. 1 Domestic Manila Rope	6.25/ 7.50
No. 1 Foreign Manila Rope	5.25/ 6.25
Domestic Sisal Strings	4.00/ 4.50

WASTE PAPER MARKET

Mill Prices, f.o.b. Trucks Shipping Point — Includes Brokerage

These quotations are a partial indication of the price range on volume tonnage in each market on the date specified, as gathered from major dealers and brokers. SPECIAL PACKINGS AND SPOT TONNAGE NOT INCLUDED. Prices nominal.

	New York	Boston	Chicago	Los Angeles
	July 14	July 14	July 14	July 14
No. 1 Mixed Paper	$5.00/ $7.00	5.00/ 7.00	4.00/ —	12.00/ —
No. 1 News	13.00/ 15.00	12.00/ —	14.00/ —	14.00/ —
Overissue News (Lg. size)	11.00/ 14.00	11.00/ 13.00	19.00/ —	18.00/ —
Mill Wrappers	10.00/ 13.00	10.00/ 12.00	7.00/ —	13.00/ —
Old Corrugated Containers	26.00/ 27.00	20.50/ 21.00	19.00/ —	22.00/ —
Super Resorted Kraft Paper	30.00/ 35.00	35.00/ 40.00	35.00/ —	45.00/ —
New Double Kr. Ld. Corr. Cuts	30.00/ 35.00	35.00/ 37.50	37.50/ —	30.00/ —
(Semi-chem. medium)	40.00/ 45.00	37.50/ 45.00	40.00/ 45.00	30.00/ 35.00
New 100% Kraft Corr. Cuts	50.00/ 55.00	50.00/ 55.00	55.00/ —	45.00/ —
New Br. Kraft, Env. Cuts	65.00/ 70.00	70.00/ 75.00	55.00/ —	50.00/ 55.00
New Br. Kr. Bag Waste Prntd.	55.00/ 60.00	55.00/ 60.00	50.00/ —	55.00/ 60.00
New Br. Kr. Bag Waste Unprintd	60.00/ 65.00	65.00/ 75.00	65.00/ —	55.00/ 60.00
No. 1 Groundwood Shvs.	21.00/ 25.00	20.00/ 25.00	14.00/ —	30.00/ 35.00
White Newsblanks	42.50/ 50.00	42.50/ 50.00	35.00/ —	55.00/ —
No. 1 Soft White Shvs.	55.00/ 60.00	60.00/ 65.00	55.00/ —	— / —
Super Soft White Shvs.	65.00/ 75.00	75.00/ 85.00	65.00/ —	— / —
Hd. White Shvs.	85.00/ 95.00	95.00/105.00	85.00/ —	85.00/ 90.00
Hd. White Env. Cuts	105.00/110.00	110.00/115.00	90.00/ —	100.00/110.00
Col. Tab. Cards	50.00/ 55.00	55.00/ 60.00	47.50/ —	27.50/ —
Manila Tab. Cards	65.00/ 70.00	70.00/ 75.00	65.00/ —	65.00/ —
No. 1 Col. Ledger	28.00/ 30.00	30.00/ 35.00	40.00/ —	22.00/ —
White Ledger	42.50/ 50.00	45.00/ 50.00	52.50/ —	45.00/ —
Mixed Book & Mag.†	15.00/ 18.00	17.00/ 19.00	12.00/ —	— / —
No. 1 Books‡	19.00/ 23.00	20.00/ 22.00	27.50/ —	— / —

† Includes Time & Life; no coarse groundwood. ‡ Not to exceed 10% of groundwood.

NEWS OF SUPPLIERS

M. D. Matthews
De Laval

J. Kaner
American Enka

De Laval Steam Turbine Co. has appointed Rear Admiral Mitchell D. Matthews USN (Ret.) as manager of its service and repair division. Admiral Matthews retired from the U.S. Navy in 1957 after 30 years of service. His last Naval post was that of Supervising Inspector of Naval Material, New York, which he had held since 1954.

American Enka Corp., producer of rayon and nylon yarns and fibers, has added to its staff Jay Kaner as manager of advertising and sales promotion.

A. R. Merritt

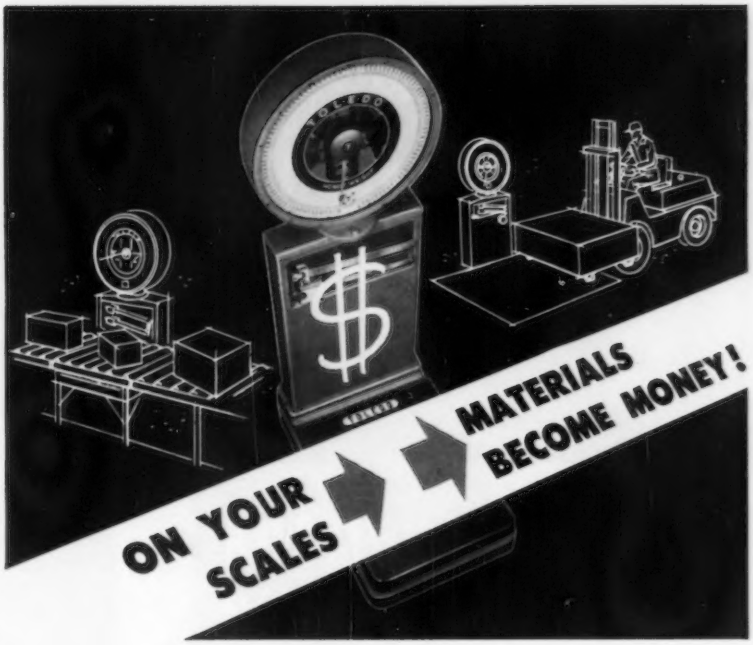
L. P. Thies

L. E. Stanton

Goodyear Tire & Rubber Co. chemical division has created three new district manager positions to coordinate direct field activities.

Appointed to fill the posts are A .R. Merritt, Hartford, Conn., L. P. Thies, Detroit, Mich., and L. E. Stanton, Houston, Tex.

The Goodyear Chemical Division, with 15 field offices throughout the country, markets high polymer resins, rubbers and latices. Complete sales and technical service for all products will be available from the new district offices.



It will pay you to check now

on weighing efficiency in your plant!

For proper cost control, efficient weighing is a prime requirement. Weight records directly affect costs, quality, inventory control and customer billing. You can avoid weighing errors and inadequate weight data by placing the right scales in the right places . . . all properly integrated in a *plant-wide weighing system* to supply basic accounting records on materials received, transferred and shipped.

You can easily check up on the job your scales are now doing. Just ask for the exclusive Toledo Weight Fact Kit. A Toledoman will gladly explain how it will help you detect and correct weighing inefficiencies in your plant. REQUEST YOUR WEIGHT FACT KIT NOW. No obligation. Address Toledo Scale, 1424 Telegraph Rd., Toledo 12, Ohio.

TOLEDO SCALE

DIVISION OF TOLEDO SCALE CORPORATION

Headquarters for Weighing Systems

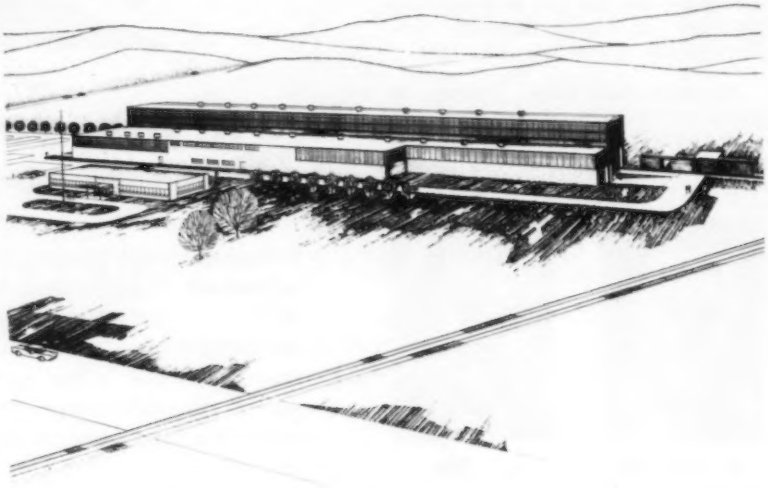
SERVICE
Factory-Trained
200 Cities

Nopco Chemical Co.'s Paper Chemicals Division sales representatives outlined the forthcoming sales program at the July meeting held in the firm's main plant in Harrison, N. J. Back row left to right: George Motz; J. V. Wolff, Larry Strange; James Fritz; John Craig; Russell Lakey; Richard Spain, Midwest regional manager; John Gammon, Southern regional manager; Clark Snook; Frank Faust; and Arthur Waldron. Front row left to right: Harold Graden; Joseph Arthur; James Holmes; William McCready; and Alfred Hartley, Paper Chemicals Division manager.

H. Rimberg & Associates, finishing room consultants to the paper industry, announce the opening of offices at 550 Fifth Ave., New York 36, N. Y. The newly organized firm is headed by Harry Rimberg in association with his brother, Edward Rimberg.

With over 30 years experience in the paper industry, Harry Rimberg has been employed since January 1956 by J. & J. Rogers Co., Ausable Forks, N. Y., where his work included the highly successful redesign of the finishing room. Previously, he had been employed by the Norden-Ketay Corp., Milford, Conn. and had organized the Paper Converting Co., New York, N. Y.

Edward Rimberg is a graduate of the Polytechnic Institute of Brooklyn and has also been active in the paper industry for several years.



Manchester Machine Co.'s New Plant . . .

. . . now under construction, was started late this spring in the face of the recession when so many companies have been retracting instead of expanding. It will have total area of 100,000 sq. ft. The main bay of the manufacturing building is 70 by 580 ft. and will provide 35 feet of erection right under the crane hook. Locker rooms and parking facilities are planned for 300 employees. Occupancy is expected by March 1959. Many new machine tools will be purchased when the company moves into the new building.

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Process Studies, Design, Specifications and Construction Supervision

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Steam, Hydraulic and Electrical Engineering

Reports Consultation and Valuations

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Design · Construction · Modernization

THE RUST ENGINEERING CO.

930 FORT DUQUESNE BLVD.
PITTSBURGH 22, PA.

BIRMINGHAM • BOSTON • NEW YORK

United States Rubber Co. has named Dr. Wesley S. Coe director of research and development for its Naugatuck Chemical Division. He replaces Dr. D. Lorin Schoene who has just been appointed an assistant director of research and development for the rubber company.

R. T. Vanderbilt Co. announces that it now has resumed sale of its Rayox brand of titanium dioxide. The company pioneered in the use of titanium dioxide in the paper industry in this country. The company a few years ago discontinued the sale of Rayox. It is now back on the market in both rutile and antase grades.

With offices in New York City, Portland, Ore., Kalamazoo, Mich. and Savannah, Ga., and with laboratories in East Norwalk, Conn., the Vanderbilt Co. is again prepared and equipped to fulfill the titanium needs of the paper industry.

Knox Felts

KNOX WOOLEN COMPANY

CAMDEN, MAINE

America's First Manufacturer of Endless Paper Machine Felts

ELIXMAN
CORES CAPS

Straight wound paper cores made in sizes from 2" to 10" inside diameter with any thickness wall required.

Long draw protected slot caps of heavy gauge steel in all standard sizes.

Heavy duty caps with reenforced square hole. This patented feature of reenforcement gives added strength and durability.

Samples of caps or cores will be gladly submitted

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CORINTH, N. Y.

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CARBON BLACKS OF EXCELLENCE

ESPECIALLY ADAPTED TO THE NEEDS OF THE PAPER INDUSTRY— SUPPLIED UNCOMPRESSED, QUARTER-COMPRESSED OR DUSTLESS.

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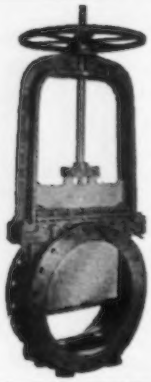

RECORD PAPER & PULP STOCK VALVES "BONNETLESS" SELF CLEARING---"RESIDUE POCKETLESS TYPE"

METALS — I.B.B.M. all iron, bronze or stainless steels, body parts plain or rubber lined.

The photo of 24" Fig. 241 I. B. B. M. valve while illustrating the gate bottom wedge system for forced gate seating and "GUILLOTINE" edge for shearing fibre at seat also shows the packing box and yoke as separate units. Both adjustable

- The "FAST THREADED" screw stem and ball bearing speeds valve operation.
- The packing box is extra deep, is adjustable and provided with specialized lubricated packings and special type gland and compression bolts.
- The yoke mountings are such that yokes for various methods of gate operation are interchangeable.
- Replaceable gate edge shoes are used in valves 10" and larger. These shoes are of special value when valves are installed stem and pipe horizontal.

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RECORD FOUNDRY & MACHINE COMPANY

LIVERMORE FALLS, MAINE, U. S. A.

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The fast, economical, modern drying method:

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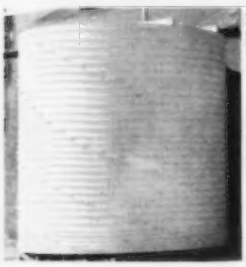
BLEACHED SULPHITE PULP

for the manufacture of cellophane, rayon and paper products

FRASER COMPANIES, Ltd.

Edmundston, N. B., Canada



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UNIFORM SUPERIOR DEPENDABLE

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TRADE MARK

First Choice in REPLACEMENT TACKLE for all makes, sizes & types of Stock Treating Equipment

- Custom Heat Treated Steel
- Bolton Special Stainless Steel
- Hard Rolled Phosphor Bronze
- Specialized Metallurgy
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- Precision Craftsmanship

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and
The EMERSON Manufacturing Co., Division
Lawrence, Massachusetts

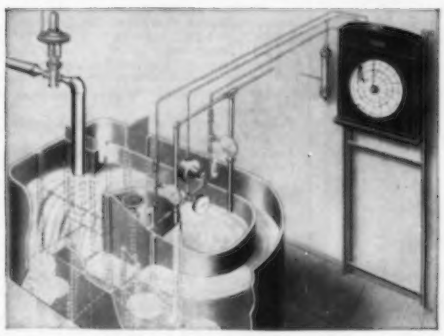
21 SECONDS *to Test Stiffness of Paper and Paper Board*

That's all it takes to measure samples up to 0.25" thick with the motorized Gurley Stiffness Tester. It easily handles tissue, newsprint, book, bonds, ledgers, industrial papers, cardboard, carton stocks; and permits a wide range of readings from 1 to 3,358,720.

Precision strip cutter also available. Write for Bulletin 1400, describing complete line of Gurley paper testers.

W. & L. E. Gurley, *520 Fulton Street, Troy, N.Y.*

...The Brammer



Highly effective consistency control

Holds stock consistency accurately to plus or minus 1/10 of 1%. The Brammer Recording Consistency Control —product of Pandia Inc. Division—is doing it wherever installed.

No moving parts—no maintenance problems.

Available for full flow or bleed-off operations—ideal as the basic element of a complete stock proportioning system.

Get details from Pandia.

THE BLACK-CLAWSON COMPANY
Pandia Division
Hamilton, Ohio

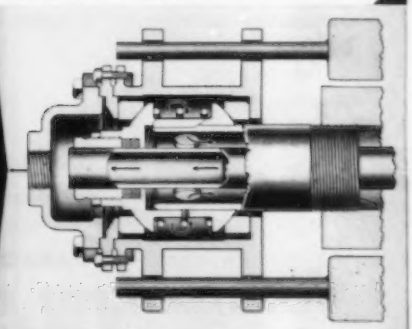
For High Speed Paper Machines with Revolving Syphon Pipes

In the Type LN Johnson Joints the revolving syphon pipe is made a part of the rotating assembly, yet is permitted longitudinal movement. Sealing is still accomplished without packing. Simple support rods carry all the weight of joint and connections, permit the rotating assembly to "float" freely inside. Special hangers and brackets adapt the mounting for machines with either open or enclosed gearing.

Johnson Joints fit all needs on paper machines, calenders, corrugators, waxers, embossers, roofing machines, printing presses. For full data on Type LN write for Bulletin N-2002.

Type LN *Johnson* ROTARY PRESSURE *Joints*

"First in the paper industry"



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Help Wanted

PAPER MEN
$5,000 to $50,000

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PAPER PERSONNEL CONSULTANTS
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PROJECT CHEMICAL ENGINEER

Large completely integrated Kraft Paper Mill in Northeast Florida seeking Graduate Project Chemical Engineer with 3 to 5 years experience for paper mill operating problems. Please submit detailed resume of experience, education, salary requirements, and personal data. Replies will be held in strictest confidence. Reply to Box 58-173 care Paper Trade Journal. Jy-21

NEWSPRINT SALESMAN

YOUNG MAN age 30-40, college graduate preferred but not essential. Must have newsprint sales experience. Excellent future for right man. Salary comparable to position. Replies held in strictest confidence. Reply to Box 58-172, Paper Trade Journal. Jy-21

Help Wanted

PAPER CONVERTING MACHINERY DESIGNER

Wanted by manufacturer of paper and film bag machinery and printing presses.

Located in pleasant New Jersey community.

Degree not necessary—only the ability and practical background for independent design of converting machinery.

Excellent opportunity for capable man. Salary open.

Please send resume of experience. Box 58-13 care Paper Trade Journal. TF

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Leading manufacturer of stock preparation equipment has excellent opening for salesman with engineering degree and good background of paper mill experience. Keen interest in and knowledge of refining processes desirable. Please send complete resume of experience, including salary requirements. All replies held in confidence. Address Box 58-177 care Paper Trade Journal. Jy-21

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Capable of assuming full responsibility of Specialty Paper Board Mill. Substantial stock ownership immediately available on basis of cash investment and profit participation with anticipated eventual retirement of present owners. Record of previous successful management essential. All replies confidential. Box 58-170, Paper Trade Journal. Jy-21

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M.S. or Ph.D. in Chemistry or Chemical Engineering with 3-6 years experience in paper coatings, resins and resin emulsions. Knowledge of paper coating equipment and polymer chemistry is essential. Ability to plan and organize project, write clear, readable reports is also important. Successful candidate is expected to advance rapidly to Project Leader.

Age under 32.

Send details of education, experience, and personal data to:

Personnel Director
WEST VIRGINIA PULP AND PAPER COMPANY
Mechanicville, New York

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West Coast Branch:
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1—54" 1-color Rotogravure Press
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1—42" 2-color Rotogravure Press
1—36" 3-color Rotogravure Press
1—31½" 4-Color Heinrich Flexographic Press.
1—31" two color Wolverine Flexo-Printer
1—30" 4 Color Kidder Flexographic Press
1—30" Kidder 6 station Flexographic press
1—26" 4 color Kidder Flexographic.
1—39½ Hobema (German) Press, 3 colors Flexo, 1 color gravure.
1—24" 4-Color Kidder Colloprinter
2—12 x 12 and 1—9" x 12" New Era Presses
1—7" Young Label Printer

TAILPRINTERS

1—32" 2-color 8 pitch.
1—30" 2-color Dietz 10 Pitch.

POWER PAPER CUTTERS

Seybolds: 65" & 52" Model CFF with auto spacing air table & Warner elec. dr. 41" Seybold Saber; 56" & 64" Precision: 50", 56" & 65"—10Z; 60"-20th Century; 35" and 84" Dayton, 6Z 65" Holyoke. Sheridan: 36" new model, Oswego: 44", 38", & 34", 54" heavy duty.
1—52" Lawson, Auto Spacer.

CAMACHINES

1—60" Cameron Type 42, for small rolls.
1—72"—10-04 8 Shear Cut.
1—72"—10-5 with water cooled brake
1—66" & 2—52" 9-5.
1—62" 26-2A with 100 score cutting units
1—62" 26-3A.
1—62"—40—1—AF
1—52", & 1—42", Model 24-7.
1—42" Type 9-5-A Roller Bearing 1500 fpm.
1—42" Type 24-2A
1—30", 1—42", 1—62" Type 6

OTHER SLITTERS

1—38" and 1—40" Beck Razor Blade.
1—60" Langston Type A.
1—48" Langston Heavy Duty Board Slitter.
1—45" Ruf Duplex Winder.
1—42" Kidder Merchant Model
2—24", 1—30", 1—36" & 1—40" Kidder S.L. Shear cut

MISCELLANEOUS MACHINES

1—54" and 1—72" Mayer Equalizer Waxing machines.
1—54" Coating & Gumming Machine, complete—for Kraft paper.
1—52" Parry Liner with Reeves Drive.
1—48" Asphalt Saturating Machine, complete—for Fibreboard, Felt or Kraft Paper.
1—37" & 1—60" Hot Melt Coaters & laminators.
1—Satchel Bottom Potdevin Cellophane Bag Machine, Model 72 C.
1—24", 1—30" & 1—46" Waldron Reverse Coater.
1—Knowlton Tube Winder with Recutter.
1—Simplex-O-Matic Model B, Cellophane Packaging Machine.
1—81" Hudson Sharp Toilet Converter for both toilet & towels
4—Hamblet Sheeters 42", 65", 84" & 100"
1—30" Peters Sheeter, Model UD.
3—Schultz continuous roll winders. Two—12", One 18".
2—Model B, 10 Bagprint machines.
Die Presses: 1—60" x 28", Type UA, 2—17" x 42" Seybolds.
2—24" x 38" Kidder Die Presses
1—2 Web, 1—3 Web Paper Converting Co.'s. Jr. Dispenser Napkin Machines
1—Potdevin Model 111-CF & S Cellophane Bag Machine.
1—Manhasset F.&S. Bag Machine, large range.
1—Package Machinery Company Model U-4 Cellophane Wrapping Machine.
1—Hayssen wrapping machine with electric eye.
2—Simplex Model "B" Packaging Machines with Electric Eye
1—Roto Model C Cellophane Bag machine
1—Weber Model 2-CN Cello Bag Machine
1—50" Hudson Sharp Embosser-tinter.
1—48" Unicraft Embosser
3—Waldron Embossers: 1—22", 1—46" & 1—60" (latter two heavy duty)
1—30" Dornbush embosser.

JY-21

BEATERS
2—1500 lb. rag beaters, Valley Iron, bandless rolls, 54" x 48", cast iron tubs.

CALENDER STACKS
1—3 roll 30" face friction Calender Stack (Holyoke), 2 iron rolls, 1 cotton roll and 1 spare cotton roll.
1—3 roll 84" calender stack.
1—4 roll 72" Calender Stack. (Extra heavy duty).
1—5 roll 82" face.
1—5 roll 86".
1—7 roll, 84" face.

CHIPPERS
1—96" Murray 4 knife Chipper—anti-friction bearings.
1—84" 10 knife Carthage Chipper. Anti-friction bearings.
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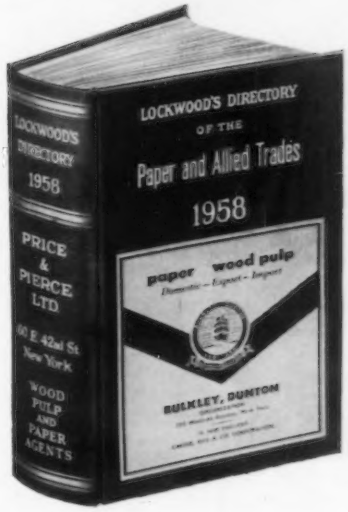

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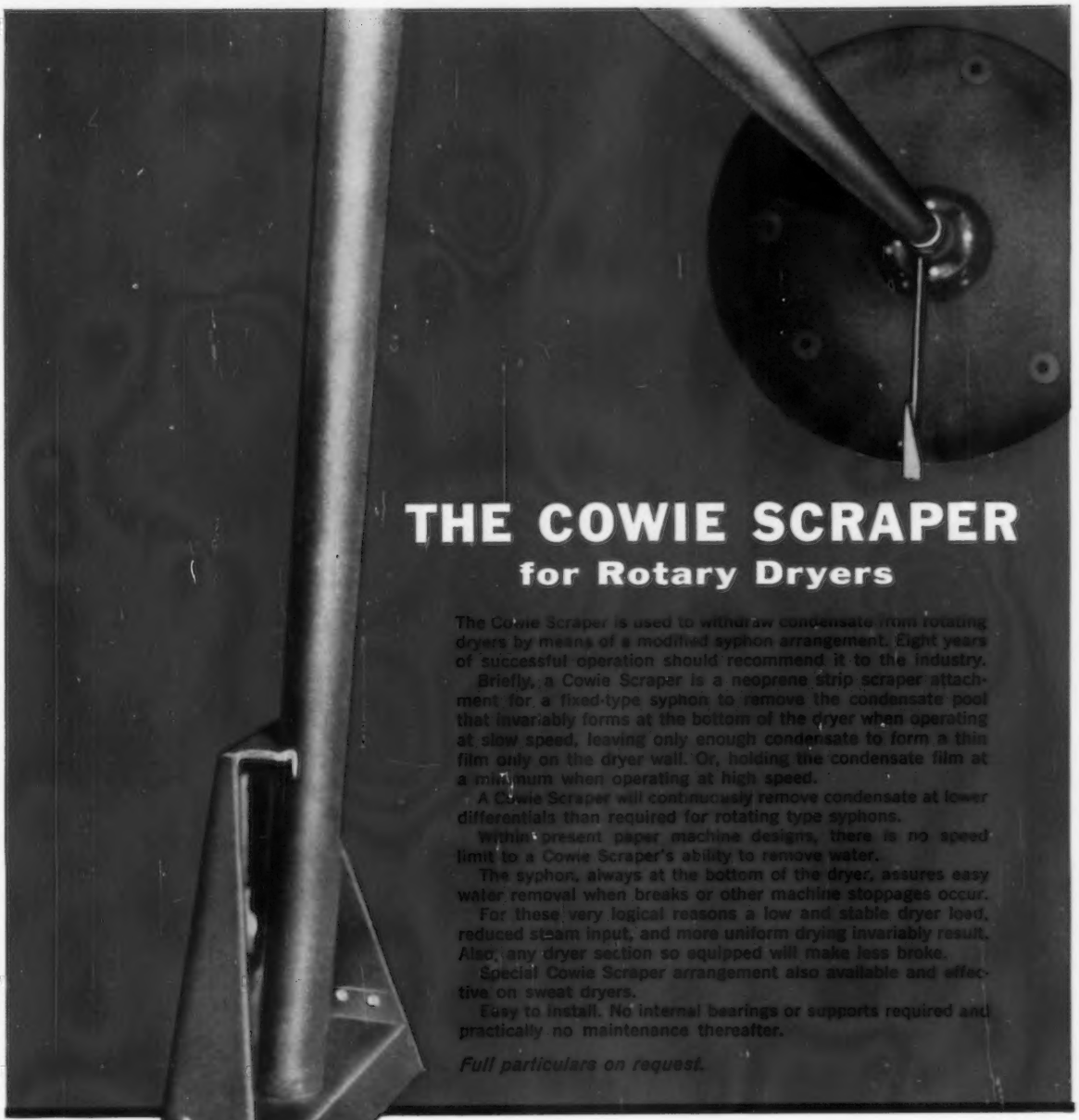

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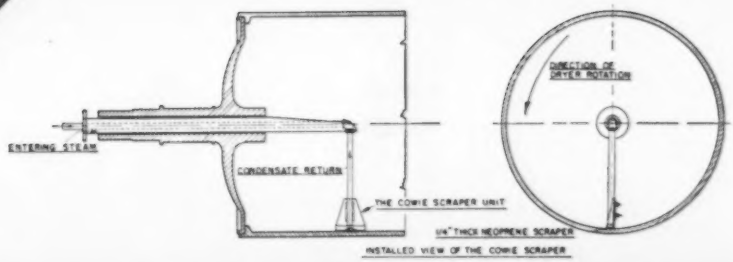

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